DOCTORAL THESIS

Primary teachers' reflections on their response to three phases of the PNS and their perceptions of the effect these responses had upon their experiences of teaching mathematics

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Primary teachers' reflections on their response to three phases of the PNS and their perceptions of the effect these responses had upon their experiences of teaching mathematics by

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Abstract

The government introduce policy in response to economic priorities and with a view to raising standards in education (Ward & Eden, 2009, Askew et al, 2001). Teachers are expected to respond to policy and their enactments are observed and assessed by colleagues and Ofsted inspectors. Their responses are affected by their teaching experiences, their capacity to make changes to their practice and their perceptions of how they should respond. I wanted to understand what teachers considered within a changing policy landscape and how their daily mathematics lessons were affected.

I designed a qualitative, interpretative research study that involved interviewing 29 teachers. My sample consisted of head teachers, deputy head teachers, mathematics coordinators and class teachers. I drew on policy enactment theory to explore their responses. Social constructionism theory enabled the teachers and myself to co-construct an understanding of their actions and the effect of policy on their professionalism. I undertook a thematic analysis to facilitate the emergence of themes from the data.

I found that policy was not enacted as intended by the government, particularly when the changes to teachers' mathematics teaching were significant. Teachers have varying levels of security in terms of their pedagogical content knowledge (PCK), which fluctuated as they experienced policy changes. Teachers made connections to policy when they reviewed and updated their practice. Conversely disconnections were made when teachers perceived that their PCK was more relevant than policy. Policy was a means of professional development, which depended on teachers' capacity to recognise potential enhancements to their practice. My findings suggest that professional development should have a lasting effect in order for teachers to manage future policy changes. Teachers were autonomous when they perceived that they could act upon their professional judgement and adapt or ignore policy. In contrast teachers' autonomy was limited when they perceived that policy superseded their professional judgements.

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Glossary of terms

Autonomy	Teachers make professional judgements that they are free to act upon (Pitt & Phelan, 2008)
CPD	Continuing professional development
ECF	Early Career Framework
ECT	Early career teacher (less than five years' experience)
INSET	In service educational training
ISP	Intensive Support Programme (the Programme)
Key stage (KS)	Stages within the National Curriculum. KS1 is years one and two. Lower KS2 is years three and four and Upper KS2 is years five and six.
LA LEA	Local authority Local education authority
MLPA	Mid-level policy actor (Singh, Thomas and Harris, 2013)
NC	National Curriculum
NNP	National Numeracy Project
NNS	National Numeracy Strategy
NQT	Newly Qualified Teacher
NS	National Strategies
PCK	Pedagogical content knowledge
PISA	Programme for international student assessment

PNS	Primary National Strategy
Policy	A text and also a process of making change
Policy enactment	A theory that includes teachers' interpretation, translation, reconstruction and remaking of policy (Ball, Maguire and Braun, 2012)
Professional development	Activities and events designed to enhance teachers' practice
Professional judgement	Decisions made by teachers when drawing on their experience and PCK
Professionalism	Seen in teachers who are autonomous, collaborate with others, have professional knowledge and engage in CPD
SATs	Standard attainment tests (also known as national tests)
SLT	Senior leadership team that includes a head teacher, assistant and/or deputy head teachers and teachers with leadership positions (e.g. head of KS2)
Teaching methods	Ways in which mathematical concepts are taught (e.g. use of a number line, columnar calculations)

Chapter One - Introduction

1.1 Introduction

It was during my time as a year six teacher in a primary school in a London borough that I first questioned how policy affected the teaching of mathematics. I was surprised to find year six pupils attaining at a year two level and I became interested in why they had not made progress. These pupils' educational careers (2002 – 2008) spanned the time of National Strategies (NS). The National Numeracy Strategy (NNS) had been in situ from the time that they were in reception to year three. From year four to year six the Primary National Strategy (PNS) was current policy. The NS were designed to raise standards (DfE, 2011), however I recognised that mathematics is a subject that can evoke pupils' mis-learning of concepts or they could dis-engage and reject learning (Illeris, 2007). I also recognised the potential for pupils' learning to be influenced by the different teachers who taught them each year. I started to consider the effects upon pupils of their teachers' capacity to teach mathematics and their policy enactments of the NNS and the PNS.

Planning and teaching mathematics lessons involves several considerations by teachers. They need to consider the National Curriculum and identify a learning objective. The pupils' prior learning and their capacity to learn is also taken into consideration. Teachers then consider how to bring about the pupils' learning i.e. teaching method. Teachers draw on their own mathematics understanding and their pedagogical knowledge of how pupils learn.

Alongside these considerations are policy initiatives that resonate with the current neoliberal ideology in which schools operate. Schools operate in market terms, which Pratt (2016) argues leads to teachers being accountable for their pupils' progress. The production of league tables, performance related pay and Ofsted inspections are mechanisms designed by the government to maintain certain practices in schools.

From the introduction of the National Curriculum in 1989 to the current period there have been many changes to mathematics teaching in England's primary schools. Raising standards of pupil attainment drive policy (Webb & Vulliamy, 2007, Ward & Eden, 2009, DfE, 2011). Within schools teachers work within a culture of national attainment targets that they are expected to achieve.

Teachers gain entry to the profession by obtaining a degree and qualified teacher status and are expected to uphold professional standards throughout their careers. Professionalism entails teachers being autonomous, having secure levels of professional knowledge, working collaboratively and receiving professional development (Bottery, 1996). Teachers are also individuals with varying degrees of mathematical subject knowledge and teaching experience who have to respond to mathematics policy in terms of potentially making changes to their mathematics teaching practice.

This thesis is concerned with how teachers' policy enactment affected and is affected by teachers' professionalism. I show changes in policy by focussing on three policy phases where the NS were introduced, updated and removed. I focus on teachers' responses to their policy enactments and explore how they responded to each phase. In this introductory chapter I explain how my personal experiences developed into this research study. I explain my research aim and objectives before introducing my research questions and I provide a rationale of my research design. Finally I summarise the content of each chapter in order to provide an overview of my thesis.

1.2 My research study

I received the newly introduced NNS in 1999 at the outset of my initial teacher education (ITE). Thus when I started my teaching career in 2002 the NNS was part of my teaching repertoire for teaching mathematics. It did not occur to me that this was an education reform and the first of its kind, I saw it as a necessary part of my mathematics teaching. In 2006 the PNS was introduced and the school in which I was working purchased a mathematics scheme to accompany the policy. I recall having a sense of unease at the swift pace of the topic coverage and I worried about those pupils who needed time to develop and consolidate their understanding.

In 2008 my school entered into the intensive support programme (ISP). The ISP was launched in response to schools 'where results remained low and where the existing model of implementation and the support from the NLS, NNS and LEAs were not having sufficient impact on standards' (DfES, 2004: 4). Schools were told that the NNS and its accompanying programme of support were sufficient for facilitating pupil progress and it was the schools' circumstances that had prevented progress (DfES, 2004). I remember the assistant head teacher telling me that she was not happy that too many pupils had not achieved the minimum attainment of level four. A local

authority (LA) consultant was assigned to my school and was involved with the planning, teaching and assessment of mathematics. The consultant modelled how mathematics should be taught and provided my colleague and I with her planning and a teaching schedule for preparing the pupils for their national tests. The impact of this was that I felt a diminished sense of professionalism as I was expected to deliver pre-prepared planning. I had spent time teaching the pupils to articulate their mathematical understanding in order to identify what they knew and I planned accordingly in order to develop their understanding. The consultant's approach was more procedural as it focussed on concepts related to number and formal calculations that could equate to correct answers on the national test papers. The consultant told the pupils which types of questions to focus on within the test in order for them to complete enough and attain the pass mark. These pupils were coached to attain the requisite level and I perceived that they maintained their poor understanding of mathematics (Penfold, 2010).

The previously mentioned actions may have occurred as a result of the pressure experienced by the head teacher who focussed 'in the short term' (Waters, 2011: 59). The assignment of the consultant may have abated this pressure as her actions were designed to raise pupils' attainment and facilitate the school's progression out of the ISP. Our mathematics teaching was managed into a prescribed format through the 'managerial actions' of the head teacher (Berry, 2012: 404). Thus, my colleague and myself complied with the consultant's planning and recommendations.

The pressure and narrowed focus did not affect my colleague to the same extent as it affected me. The two year six classes were separated into pupils who were on track to attain level four and those who were not. My colleague taught the pupils who were on track. I taught those who needed to progress through two levels within the year and this was my third year of teaching this group of pupils. My colleague seemed happy to use the consultant's planning and she created accompanying Smartboard slides. Her professionalism appeared to have been enhanced through her compliance with the consultant's recommendations. She took ownership of the teaching and acted in accordance with her judgement that the planning was relevant. According to Pitt and Phelan (2008) my colleague was autonomous as she had been free to make a professional judgement and take action. There may have also been an element of professional development for my colleague who was new to year six and had previously taught pupils in key stage one.

I resisted following the consultant's planning, to some extent. The events described coincided with my final year of studying for my Masters in Education where I learnt about the value of talk and I had started to develop pupils' initial understanding into progressive points aimed at securing their mathematical understanding. While I presented the consultant's planning in my file I drew on it for the teaching schedule and topic coverage. I continued to include pupils' talk in my teaching and I did not teach formal calculations. I struggled to accept that the consultant's approach could have benefitted the pupils in such a short time as there was no consideration for their current understanding that recognised the gaps in their learning. In what became my final year in the school I struggled with the expected 'shift from professional autonomy' towards a more procedural process (Webb & Vulliamy (2007: 562). I left the school as I could not align how I believed mathematics should be taught with the head teacher's. Webb and Vulliamy (2007: 562) empathise with professionals who experience 'reduced job satisfaction' when they are governed by others.

I became a tutor on an Initial Teacher Education (ITE) Programme in 2010 while the PNS was current policy. Student teachers were taught that the PNS' planning accompanied the National Curriculum (NC). Although the NNS was no longer current policy its mathematic models formed and indeed still do form a foundation for breaking mathematics down into component parts. I was surprised at the number of first year student teachers who said that they were not able or did not like mathematics. I heard similar comments from a number of student teachers in the third year. It was concerning to hear of some students' perceptions that they had not progressed in terms of their ability and/or liking of mathematics. I questioned how these students would go on to become teachers who taught mathematics daily and how effective their teaching might be.

My experiences led me to question how teachers' experience, their mathematical knowledge and policy affected their mathematical teaching. More specifically I asked:

- What is mathematical knowledge in mathematics teaching?
- Should teachers know how and what to teach or can policy be helpful in developing or extending teachers' professional knowledge?
- To what extent can policy affect teachers' mathematical teaching?

I refined these areas of interest to focus on the period of time where the NS was in situ as well as its removal in 2011. In order to differentiate amongst the different policies I separated them into

three policy phases. Phase one relates to the time prior to the launch of the PNS, when the NNS had been in situ (1999-2006). Phase two was the middle period, where the PNS was in situ (2006-2011). Phase three was a unique time as the PNS was removed and three years later a NC became statutory policy (I conducted my participant interviews in 2015). I now turn my attention to the aim and objectives of my research and my research questions.

1.3 Research aim, objectives and questions

The aim of my research was to explore teachers' responses to the changes in policy and the effect these changes had upon their mathematics teaching. The policy phases are central to my research therefore I chose not to explore teachers' identity, agency or their school contexts. Omitting these areas allowed me to explore teachers' policy enactments through the theoretical lenses of policy enactment and the social construction of teachers' professionalism.

There are three objectives of my research study. First, to gain an understanding of how teachers perceived they had responded to each policy phase. Second, to understand the effect teachers' policy enactments had upon their mathematics teaching. The third objective is to understand the teachers' constructions of their professionalism.

In order to explore teachers' responses and understand the effect the three policy phases I asked the following research questions:

1. What are primary teachers' reflections on their responses to three phases of the Primary National Strategy (PNS)?

2. What are their perceptions of the effect these responses had upon their experiences of teaching mathematics in the following phases?

- Phase one – Prior to the launch of the PNS
- Phase two – During 2006-2011 while the PNS was current policy
- Phase three – Following the removal of the PNS

3. How are responses similar or different between each phase and within the phases?

1.4 Rationale of my research design

I designed my research study using a qualitative methodological approach in order to explore the participants' experiences, as recommended by Miles and Huberman (1994). I decided to interview teachers and talking with them enabled me to be part of the social construction of their understanding of their experiences. I was also able to ask for clarification (and so were the teachers) or pursue pertinent points.

I undertook convenience and purposive sampling and planned to interview 30 teachers, which Cohen, Manion and Morrison (2018) claim is the optimal sample size for a small research study. I adopted convenience sampling in five schools where I have a professional relationship through my current ITE role. In addition I undertook purposive sampling to ensure that the teachers had been in their role since at least 2006 when the PNS was introduced.

Later within this thesis (section 4.3) I reflect upon the analysis of my data, drawing upon Bryman (2016) and Braun and Clarke's (2006) thematic analysis models. In brief, I focussed on the topics that teachers spoke about within their interviews. Then I applied Mason's (2002) idea to only select the responses that addressed my research questions. My themes contained similar responses as well as discrepant cases that enabled me to provide broad and balanced findings.

1.5 Contribution to knowledge

This thesis contributes to the field of policy enactment through my comparison of teachers' responses across three policy phases. I will demonstrate how teachers are affected by the changes governments make to mathematics policy and suggest that school autonomy could ease the transition from one policy phase to the next. An additional contribution of my research is the focus on teachers' professionalism in terms of their policy enactments and their mathematics teaching. Tension occurs when teachers perceive that they have to enact policy, despite their experience, PCK and their professional judgements. I introduce the idea of teachers drawing on policy and making connections to it or having a disconnection from policy when they perceive that their PCK is secure and/or more relevant. I suggest that teachers benefit from guidance, in the form of policy or a mathematics scheme, which resonates with current mathematical policy that suggests the use of high quality textbooks for mathematics teaching.

1.6 An overview of the thesis

I now turn my attention to the structure of this thesis. This introductory chapter provides the rationale for my research study along with the aim, objectives and research questions. Providing brief detail of my research methodology shows how I planned to explore teachers' responses to policy. I signpost my contribution to knowledge.

Chapter two

I review the literature, focussing briefly on education policy in England and I consider the various definitions and applications of the term policy. I explain the four characteristics of professionalism; autonomy, collaboration, PCK and professional development. New professionalism changes teachers' professionalism in terms of a reduction of autonomy, which I discuss. Policy is discussed in terms of how it operates within a global capacity and is designed to provoke action and change within schools. I describe the characteristics of professionalism, which are autonomy, collaboration, professional development and professional knowledge. I draw on Shulman's (1986) definition of mathematical knowledge teachers need to bring about learning, their PCK. I also discuss accountability and performativity, which appeared to gain momentum within the 1990s. Finally I describe and discuss the NC and the NS as key policy events in England. I review the effect of the NNS upon teachers' mathematics teaching.

Chapter three

Within this chapter I introduce and define the theoretical resources that underpin my research study. I review several research studies in order to present a thematic summary of the research regarding professionalism and policy, e.g. teachers' responses to the NC and the NNS.

Social constructionism theory is explained and critiqued, drawing principally on Burr (2015). I review social constructionism research and identify its strengths and limitations within the context of my study.

Chapter four

I discuss my research methodology and I provide my justifications for my methodological decisions. I describe why and how I used a qualitative methodological approach in the interpretative paradigm in order to explore the teachers' responses. I discuss my epistemological and ontological stances of social constructionism. I explain and reflect upon my thematic data analysis that I consider

lengthy yet rigorous and robust. I also reflect on my methodological actions e.g. which data I selected or omitted for interpretation and I provide a rationale for my choices.

Chapters five, six and seven

I present the teachers' responses and discuss my findings within the following three chapters:

- Chapter five – professional development, PCK and acceptance in phase one
- Chapter six – pressure, criticality and professional judgements in phase two
- Chapter seven – change and challenge in phase three

The teachers' reflections are presented verbatim and are arranged in terms of whether teachers considered the policy useful, useful to some extent or not useful. I draw upon my theoretical frameworks to examine the teachers' responses in terms of their policy enactment and professionalism within my discussions. Chapter five contains a greater number of responses that show the policy was useful for teachers. There is a greater sense of criticality in chapter six. Chapter seven shows that the introduction of the 2013 NC, while not part of the NS, had a significant effect on teachers' mathematics teaching.

Chapter eight

Within my concluding chapter I respond to my research questions. I include recommendations for future policy enactments and mathematics teaching. I discuss the uses and limitations of policy enactment theory and social constructionism theory. I also present four key limitations to my research study and suggest areas for future research.

Chapter Two – Literature review

2.1 Introduction

Within this chapter I provide an overview of policy as a process before addressing the key concepts that inform my research. I explore connections between the literature pertaining to education policy and teachers' professionalism. I start with a synopsis of policy before stating the definitions I adopted for my research study. I then examine the government's rationale and aims for two key policies, the NC and the NS. Following this I define and discuss professionalism. Professionalism incorporates characteristics that affect and are affected by teachers' policy enactment; autonomy, collaboration, PCK and professional development. This chapter will show changes to education policy and includes the government's perspective along with research showing teachers' responses. I now turn my attention to the definition of the key terms.

2.2 Policy as a process

Policy is not limited to a document containing text, rather it is 'textual intervention into practice' that involves enactment (Ball, 1993: 12). There is not a single definition of policy, the term has different meanings depending on the context in which it is presented. Policy provides suggestions for change although it addresses a generic audience, e.g. the NNS addressed teachers and schools (DfEE, 1999). Policy makers may be government based, e.g. working at the Department of Education or school based, e.g. a mathematics coordinator. Policy actors are those who receive policy (Ball & Bowe, 1992, Heclo, 1972, Scott, 2000, Ball, Maguire & Braun, 2012, Singh, Thomas & Harris, 2013).

Heclo (1972: 84) argues that policy is 'a course of action intended to accomplish some end', which implies that policy makers have pre-empted particular results from policy. Smith's (1976: 15) definition differs as he suggests that policy can lead to 'action or inaction'. Recent definitions strengthen the role of policy. Rizvi and Lingard (2010: 4) claim that policy is 'designed to steer the actions and behaviour of people' in order to produce a desired outcome. Similarly, Bates, Lewis and Pickard (2011) define policy as a statement of intent from government accompanied by actions designed to bring about changes that will lead to a desired goal.

Policy as a process begins at the government level and can consist of a policy document, media coverage, speeches from the education secretary and the publication of green and white papers. Training events can also be part of policy as was the case with the NS. The NNS and the PNS also introduced mechanisms to facilitate enactment, such as Ofsted inspections (Adams, 2014). Policy is standardised to ensure measurement is possible and Fink (2001) argues that policy makers will want to assess the outcome(s) of their policy initiatives and testing pupils is a reliable and cost-efficient mechanism to do this.

Throughout the process people with a range of different interests, e.g. LA staff and parents receive the policy (Scott, 2000a), which results in the original policy text being 'diversely and repeatedly contested and/or subject to different interpretations' (Ball, Maguire and Braun, 2012: 2). Policy arrives in schools, which are 'complex organisational arrangements [with] already-existing practices' (Rizvi & Lingard, 2010: 5) and teachers receive a copy of policy texts and accompanying policy messages. The initial message intended by policy makers may not be the message teachers receive following this policy as a process. Adams (2014: 25) argues 'just because policy implies a set of actions this does not imply that such actions will ultimately occur or, if they do happen, that they will elicit the response they desired'. Research from Ball and Bowe (1992), Ball, Maguire and Braun (2012), and Singh, Thomas and Harris (2013) refer to policy being recontextualised each time different interpretations are made (I discuss this further in sections 2.2.1 & 3.2). Teachers will respond in a range of ways, according to their understanding of the policy and their perceptions of its relevance. Teachers' enactments involve 'negotiation, contestation or struggle' (Ozga, 2000: 3).

Policy and policy as a process allude to the same events, policy has an origin and its messages are accompanied by additional messages. Different policy actors receive and interpret policy, which means that the policy received by teachers might differ from the original (Ball, Maguire and Braun, 2012, Singh, Thomas & Harris, 2013). Teachers are part of policy as a process due to their enactments and are affected by events that take place in school, such as lesson observations and staff meetings. In addition there are mechanisms such as Ofsted inspections that inspect schools' performance. Ofsted will review how policy is affecting teachers' practice as they evaluate its effectiveness and I revisit this point in section 2.7.1.

2.2.1 Policy enactment

Policy enactment is what teachers do with policy, their thoughts and actions. Ball, Maguire & Braun (2012: 10) state 'policies can be fitted in without precipitating any major (or real) changes and/or they can produce radical and sometimes unintended changes' (brackets as original). Policy enactment is complex as it includes teachers making sense of policy, which is subject to different interpretations. Policy is put into practice by teachers and again there is a multitude of ways this could happen. Policy enactment includes the 'interpretation and recontextualisation – that is, the translation of texts into school and classroom contexts' where policy ideas meet contextualised practices' (Ball, Maguire and Braun, 2012: 3). The term recontextualisation (sic) indicates that policy is considered in different contexts, e.g. within a senior leadership meeting (SLT) in a school and also within individual classrooms. Policy enactment can involve teachers mediating or struggling with, or even ignoring policy as they reconstruct and remake policy, according to Ball, Maguire and Braun (2012).

Teachers' enactments of policy include their consideration of previous policy enactments that affect their responses (Ball, Maguire and Braun, 2012). Kelchtermans (2005) refers to policy occurring in a time and place, which he refers to as the temporal dimension. The temporal dimension is an important consideration within my research study as I asked teachers to reflect on three different periods of their careers. They drew on different experiences that affected the action they took, according to their current priorities (Ball & Bowe, 1992), e.g. while they were a NQT or had become mathematics coordinator.

Policy enactment involves four non-linear stages where teachers interpret, translate, reconstruct and remake policy (Ball, Maguire and Braun, 2012). Interpretation and translation merge as they are 'closely interwoven and overlapping' (Ball, Maguire and Braun, 2012: 47) and relate to teachers' considerations of policy. As teachers interpret policy they will make sense of it, consider what the text means to their practice and the action they might take. Policy messages are given in staff meetings and reinforced within lesson observations, therefore teachers' translations are affected by policy messages within school (Ball, Maguire and Braun, 2012: 46). The third and fourth stages are the reconstruction and remaking policy, which involve teachers' actions, or their enactments. When teachers reconstruct policy they select parts of the policy to

enact based upon their current practice. Some parts of the policy (or the whole policy) might be ignored at this stage. The remaking of policy can be affected by teachers' current customs and practice as they present within their teaching their perceptions of how the policy should be enacted. Reconstruction and remaking can merge, e.g. a part of policy that teachers perceive as beneficial for low attaining pupils is selected for enactment (Ball, Maguire and Braun, 2012).

Policy implementation is an alternative way of looking at responses to policy (i.e. rather than enactment). Policy implementation is limited in its suggestion that policy originates from the government within a top-down process (Basit, 2003) that is enacted or not, without the consideration of variances such as teachers' responses, e.g. enactment to some extent (Spillane, 1999, Maguire, Braun & Ball, 2015). The focus is on outcomes (Maguire, Braun & Ball, 2015). An example of how policy implementation is measured appears in Ofsted's (2002) report of the first three years of the NNS. The report states that increases had been made in the number of pupils who attained level two in the key stage one national tests and level four in the key stage two tests.

In sum, policy enactment is what teachers do with policy. They draw on their previous experiences, consider their current practice and think about whether and how their practice might change. Simultaneously, policy messages are reinforced or negated in messages from colleagues, which affects teachers' considerations. They then take action, enacting policy in accordance with how it resonates with their practice and the changes they perceive as necessary. These actions are affected by teachers' 'custom and practice' (Ball, Maguire and Braun, 2012: 114).

2.3 Professionalism

Professionalism is a term that defines the conduct of a group of people. Professionalism is socially constructed by people inside and outside of the profession, i.e. teachers and the government, parents and employers (Helsby, 1995). The government introduces policy and makes changes according to the UK's economic situation or as a result of a change of administration (e.g. the 2013 NC was introduced soon after the Coalition party was elected in 2010). The resultant policy changes and expectations of teachers can be seen in terms of new professionalism, which I discuss later on in this section. Professionalism is characterised by

autonomy, collaboration, professional development and professional knowledge and I define each of these within this section.

Bottery (1996) defines a professional (in the fields of medicine, police and education) as a person with expertise, who is altruistic and autonomous. Professionals recognise and address problems and they consider alternative points of view. They are dedicated, committed and highly skilled (Helsby, 1995). In addition, professionals are ethical, they challenge facts, make judgements and are mindful of public opinion. Alongside these positive characteristics of being a professional there are restrictions, i.e. teachers are managed by policy, their managers, the appraisal process and Ofsted inspections (Bottery, 1996). Teachers are guided by professional standards (Teachers' Standards) that determine their status (Hargreaves, 2000). The Teachers' Standards represent the components of teachers' roles, e.g. having high expectations of pupils, planning effective lessons. Teachers must demonstrate that they meet the Teachers' Standards during their ITE in order to achieve qualified teacher status and continue this attainment throughout their careers.

New professionalism emerged as a result of an increase in policy directives and government issued targets (Hargreaves, 2000). Professional knowledge for the new professional involves 'producers' developing and producing knowledge and 'users' i.e. teachers implementing it (Wideen, Mayer-Smith & Moon, 1996). Teachers are managed by policy when professional development relates closely to reform (Evans, 2008). New professionals are accountable in terms of meeting government national attainment targets (Evans, 2008). Hence the autonomy of the teacher is reduced, which I discuss further in the following section.

2.3.1 Autonomy

Autonomy relates to teachers making professional judgements and having the 'freedom to act' on those judgements (Pitt & Phelan, 2008: 191). In what follows I introduce the idea that teachers and schools have been autonomous in the past. I emphasise the connection between new professionalism and teachers' autonomy. Finally I state how autonomy can be paradoxical in terms of the extent of freedom teachers have.

Hargreaves (2000: 158) describes the period from the 1960s to the mid-1980s as the 'age of the autonomous professional'. During this time autonomy related to teachers' pedagogy and they

made ‘discretionary judgements’ (Hargreaves & Goodson, 1996: 20), e.g. the mathematics topics they taught. Judgements were made by teachers who worked in isolation and there were no external requirements in terms of attainment targets or their teaching approaches, according to Hargreaves (2000). The NC had not yet been introduced and school policies included the use of mathematics schemes, which ‘permeated’ most schools’ (Brown, 2010: 7). Pupils worked through mathematics worksheets or textbooks at their own pace and at the level they considered appropriate (Brown, 2010). School autonomy was prevalent as each school adopted the scheme of work they considered relevant for their pupils (Helsby, 1995).

The introduction of a NC was designed to unite schools’ practice and set national attainment targets (Ward & Eden, 2009). It signalled the start of new professionalism and the reduction of teachers’ autonomy. Teachers, as a collaborative group were expected to follow policy directives, therefore their capacity to make individual judgements was restricted (Hargreaves, 2000).

The definition of autonomy that I use within this thesis is that teachers make professional judgements and are free to act accordingly (Pitt & Phelan, 2008). By including the term free I present autonomy as paradoxical. Teachers are free within the constraints of the Teachers’ Standards that they must achieve during their ITE and maintain throughout their careers. Coburn (2001) argues that teachers’ autonomy relates to the decisions they make within the domain of achieving outcomes, e.g. achieving national attainment targets. The outcome of pupils’ attainment is published in league tables and therefore teachers’ judgements will be affected by their need to be perceived as effective in their teaching (Berry, 2012, Pratt, 2016).

2.3.2 Collaboration

Collaboration involves professionals working together, sharing ideas and reflecting on their practice. Teachers have an opportunity to discuss their concerns or misunderstandings and gain clarity on their possible responses to policy (Coburn, 2001). Collaboration with colleagues is conducive for teachers solving ‘the ongoing problems of professional practice’ in order for them to respond as opposed to implement policy (Hargreaves & Goodson, 1996: 20). In addition, teachers who collaborate as part of their professional development gain an enhanced understanding of the impact upon their practice, according to Wideen, Mayer-Smith and Moon (1996). NCETM (2009) advocates that teachers discuss relevant issues such as classroom

organisation with like-minded people during training events. Collaboration therefore provides a sense of security for teachers as they respond to change as they gain support from their peers to clarify their next steps (Wideen, Mayer-Smith & Moon, 1996, Hargreaves, 2000, Coburn, 2001). Conversely, when collaboration is expected rather than suggested (as teachers perceived was the case with the first NC) it was seen as a demand on their time that had to be endured (Hargreaves, 2000).

2.3.3 Professional development

Professional development is an enhancement to teachers' practice (Evans, 2008). Teachers might attend training events delivered by external agencies, participate in a school based in service educational training (INSET) event or undertake additional qualifications such as a Master's Degree. NCETM (2009) report that the following factors constitute effective professional development. School leaders need to have a 'wide knowledge' of both mathematics education and classroom practice (NCETM, 2009: 75). Teachers should learn of research informed teaching methods, tasks and resources (including ICT resources) that can enhance their mathematics teaching. Time is needed for teachers to attend continuing professional development (CPD) events, try out ideas and to reflect. Collaboration with peers to discuss teachers' learning and the impact on their pupils is important, according to Hargreaves (2000).

CPD events are effective when teachers' 'immediate needs' are met (Storey, 2009: 132). NCETM (2009) advocate an effective professional development cycle that involves teachers initiating a change of their classroom practice that ultimately changes (enhances) pupils' learning. This model involves teachers planning a lesson, predicting the outcomes, teaching (or observing) and then discussing the pupils' learning that gives teachers permission to make changes that lead to attitudinal change, i.e. teachers are confident and motivated and more likely to be effective (Evans, 2008).

When CPD relates to professional standards, performance management and targets teachers perceive that they are 'subservient' to the government (Storey, 2009: 122). Evans (2008) argues that professional development that occurs through government reform is demanded professionalism that results in teachers gaining functional development. This temporary change is presented by what teachers ''produce' or 'do'' while the policy is in situ (Evans, 2008: 31,

inverted commas as original). Attitudinal development involves teachers' 'acceptance' and 'commitment' to change that remains over time (Evans, 2008: 33). If teachers do not recognise the need to change or are not supported through professional development there will be a 'mismatch of perceptions' and reform will not be 'enacted in the required manner' (Evans, 2008: 34). On the other hand, new teachers who join the profession will not know any other way than reform-imposed changes to their new professionalism (Evans, 2008). Thus there is a suggestion that there is a cohort of teachers who started teaching between 1999 and 2011 who only experienced functional development (I discuss this point is chapters seven and eight).

There is a connection between policy and professional development. Barber (1995) states that policy needs to include professional development in order to continue teachers' ITE and support them in their attempts to raise standards. Hargreaves and Goodson (1996) suggest that professional development should be continuous and relevant, rather than directed by policy. These ideas resonate with the new Early Career Framework (ECF) (DfE, 2019). The ECF aims to continue teachers' professional development during the first two years of their teaching career. It addresses the eight Teachers' Standards in terms of focussing and securing teachers' subject knowledge and pupils' understanding (there is no specific mention of mathematics). Free, high quality training is available due to the government investing £130 million annually. The ECF appears to recognise the need for professional development to be supportive and responsive to the needs of NQTs.

In sum, professional development that addresses teachers' needs, e.g. preparation for promotion is more effective than that associated with reform (Evans, 2008, Storey, 2009). Functional and attitudinal development need to combine so that teachers accept and commit to their new practice (Evans, 2008).

2.3.4 Pedagogical content knowledge (PCK)

PCK is the knowledge of mathematics *for teaching* (Shulman, 1986: 9, italics as in original). Teachers need to know how mathematical concepts work and they should provide a range of examples within their explanations. They should be aware of a wide range of methods that are rooted in research and consider these alongside their 'wisdom of practice' (Shulman, 1986: 9).

Teachers will therefore apply their professional judgements in terms of addressing their pupils' prior understanding, knowing the concepts in which they are secure and their misconceptions.

PCK involves teachers having a secure knowledge (Shulman, 1986) and disseminating their knowledge within their teaching. Teachers' previous learning experiences can have a positive or negative effect on their subsequent perceptions of their PCK (Witt, 2014). For those whose mathematics experiences contained a range of rules to be memorised and applied, mathematics is considered as being conceptually difficult (Brown & McNamara, 2011). Teachers start to question their subject knowledge and create their PCK during their ITE. They need to demonstrate that they can fulfil the government's expectations, as detailed in the Teachers' Standards (DfE, 2012: 8), such as 'adapt teaching to respond to the strengths and needs of all pupils'.

Askew et al (1997) argue that teachers' mathematics knowledge affects their PCK and ultimately their teaching. The focus of the research was the effectiveness of teachers' mathematics teaching that consisted of case studies of 11 schools, across three local education authorities in England. 90 teachers and 2000 pupils were involved in the research that spanned 16 months. Askew et al (1997) explored teachers' effectiveness through the analysis of pupils' test results, interviews with teachers and observations of 84 mathematics lessons. They argue that there is 'little relation' between teachers' subject knowledge and the progress attained by their pupils (Askew et al, 1997: 346). However there is a connection in terms of teachers' capacity to develop their pupils' understanding. Teachers who are able to explain 'procedures and methods' are moderately effective, whereas effective teachers enable pupils to make 'connections within mathematical concepts' (Askew et al, 1997: 341). These findings cite the importance of teachers to develop their subject knowledge into PCK in order to develop an effective approach that facilitates pupils' understanding and progress. Over the course of the ITE programme and beyond teachers' initial knowledge transforms as they reflect on their PCK. Brown and McNamara (2011: 46) refer to teachers 'repackaging of mathematics' from their own understanding to knowing how to facilitate pupils' understanding using models, images and explanations.

Ball, Thames and Phelps (2008: 398) develop Shulman's (1986) ideas when they state that teachers 'significant mathematical knowledge' is cumulative and progressive. I now compare the two stances of mathematical understanding for teaching.

Shulman (1986) recognises three types of knowledge, content, pedagogical and curricular. Content knowledge relates to more than facts or concepts, it includes mathematical structures, e.g. composition of the number 13 is 10 + 3, 5 + 5 + 3 etc. In addition, content knowledge includes what is commonly known as reasoning and generalising, which Shulman (1986: 9) refers to as 'competing claims regarding a given phenomenon […] in which truth or falsehood, validity or invalidity, are established'. Ball, Thames and Phelps (2008) refer to common content knowledge that is general or specialised. Teachers progress from having a general knowledge of mathematics and can recognise pupils' errors in their work or address inaccurate knowledge within textbooks. Specialised content knowledge involves a deeper understanding, which Ball, Maguire & Braun (2008: 400) cite as 'knowledge beyond that being taught' that includes language, methods and models. Shulman (1986) infers this level of knowledge when he refers to mathematical structures that include an understanding of how concepts work but falls short of specifying aspects such as the use of language.

PCK is needed for teachers to know how to make content knowledge accessible and comprehensible to pupils (Shulman, 1986). Teachers need to have an understanding of their pupils' learning and attainment needs (pupils' prior learning, secure conceptual understanding, misconceptions). PCK includes the transformation of teachers' mathematical content knowledge into their teaching approaches, having knowledge of examples to explain, concepts, structures and teaching methods, according to Shulman (1986). The focus on the sequence of teaching, i.e. which points are pertinent or less important as suggested by Ball, Thames and Phelps (2008) provide additional specific detail.

Ball, Thames and Phelps (2008) do not refer to curricular knowledge. Shulman (1986) defines this as knowledge of curriculum content and the range of materials that can bring about pupils' learning. Teachers need to use the most effective materials, such as manipulative resources and software that can be sourced in what Shulman (1986) refers to as instructional materials, i.e. a mathematics scheme.

I draw on Shulman (1986) and to some extent Ball, Thames and Phelp's (2008) ideas and list what I term as PCK parts. I separated the PCK parts into two categories. The first is titled mathematics specific knowledge in recognition of the PCK relating to mathematical components. The second category relates to the consideration of pupils' learning and attainment needs.

The PCK parts are:

Mathematics specific knowledge

- Examples to explain
- Concepts
- Structures
- Methods
- Models

Pupils' learning and attainment needs

- Pupils' prior learning, concepts/misconceptions
- Thinking and language
- Sequencing of learning

Mathematics schemes can be seen as a source of PCK as they contain authoritative and legitimate support and guidance that responds with the NC (Haggerty and Pepin, 2002, Ball, Thames & Phelps, 2008, Macintyre and Hamilton, 2010). They are particularly useful to new teachers as a source of confidence (Haggerty and Pepin, 2002, Newton & Newton, 2006). Brown et al (1998) appear to empathise with teachers who need to use a mathematics scheme to reinforce their perceptions of their capacity to teach. In contrast, mathematics schemes can perpetuate teachers' own learning if they teach mathematics 'as a fragmented set of techniques and knowledge' (Askew, 1997: 353).

Teachers learn about PCK parts during their ITE, e.g. they are introduced to concepts such as augmentation and aggregation and models such as the array. They are introduced to the NC and learn how to recognise progression. ITE also includes referring to theory to understand how pupils progress in their mathematical understanding and the value of talk. A large extent of

mathematical content is new knowledge, hence student teachers learn the PCK parts that they go on to develop within their practice.

The literature (and the responses of my teachers) demonstrate how teachers consider their PCK in terms of topics such as planning. The table below (table 2.1) shows the PCK parts that underpin PCK topics.

Table 2.1: The PCK parts that underpin PCK topics

PCK parts	PCK topic
Mathematics specific knowledge Examples to explain Concepts Structures Methods Models	Assessment Differentiation National tests Numeracy hour Planning Progression Worked examples of calculations
Learning and attainment needs Pupils' prior learning, concepts and misconceptions Thinking and language Sequencing of learning	Assessment Differentiation Expectations of pupils' attainment National tests Progression Talk/activities Vocabulary

Several PCK topics appear in both PCK parts (assessment, differentiation, national tests, planning and progression). I suggest this is because teachers need to know the mathematics specific knowledge and their pupils' learning and attainment needs. I elaborate with the topic of differentiation, where teachers need to know the order in which concepts are learnt, e.g. aggregation precedes augmentation. Teachers make judgements whether to develop pupils' understanding of addition through aggregation (3 + 2 = 1, 2, 3, 4, 5) or extend their understanding to aggregation (3 + 2 = 3, 4, 5). To make these judgements teachers need to know the concepts of augmentation and aggregation. They also need to be aware of their pupils' current level of understanding and their capacity (readiness) to move on.

2.3.5 New Professionalism

As mentioned in my introduction schools operate within a neoliberal environment where they strive to attain nationally set targets. Competition exists amongst schools and they are ranked in accordance with their pupils' attainment (Pratt, 2016). Policy is designed to make changes in

accordance with the government's ideas of what is needed within the nation's economic climate (Rizvi and Lingard, 2010, Bates, Lewis and Pickard, 2011). New professionalism indicates a change in the professional status of teachers who are expected to comply with reform (Webb et al, 2004, Evans, 2008). Teachers are responsible and accountable for 'developing their knowledge and skills in accordance with the government's definition of what works in schools' (Webb et al, 2004: 90).

Troman's (1996) research provides an example of how a head teacher heralded new professionalism. A change in headship meant that teachers were expected to plan collaboratively, evaluate their teaching and engage with parents. Prior to this the teaching staff had worked 'in isolation' (Troman, 1996: 477). The new initiatives were launched at a compulsory weekend INSET event.

Teachers responded to the changes in leadership in ways that Troman (1996) describes as old professionalism (as opposed to new professionalism). Some teachers resisted the restructuring of the school and complained about the changes. They presented 'wrecking tactics' to disrupt working groups (Troman, 1996: 480). These actions continued until HMI visited the school and all but four of these teachers left the school, some taking early retirement.

Teachers who made changes to their practice were 'able to fulfil management's expectations and to survive professionally' which made them new professionals, according to Troman (1996: 481). These new professionals were autonomous as they complied with the head teacher's expectations to the extent of which they agreed with them.

Troman's (1996) research provides a clear comparison of professionalism and new professionalism within one school. New professionalism on a national scale is slightly different. Teachers' CPD focusses on government proposals to 'improve teacher methods' (Bottery & Wright, 2000: 483). In addition, teachers' autonomy is reduced as they are accountable to meet policy expectations and they are managed by performance management targets (Hargreaves, 2000, Evans, 2008).

2.3.6 Accountability and performativity

I now discuss accountability and performativity, which were introduced in England through education policy during the 1990s as education became part of a global context due to 'the need for international economic competitiveness' (Bottery, 2000: 3). Global factors impacted upon the content of the then Conservative government's manifesto, which included the need for knowledge based, technical developments in industry (Ball, 2013). This change in education came at a time when teachers were considered by the government as a homogenous group that was out-dated, reluctant to demand high standards for all pupils and hesitant to adjust their practice in response to the evolving national situation (Ozga, 2000). Within this context the New Labour party was elected to government in 1997 and focussed its attention to raising standards in education (Bottery, 2000). Within the accountability culture pupils' performance became objectified and teachers were 'publicly accountable' for achieving the national targets, through the publication of league tables that were introduced in 1992 (Perryman et al, 2011: 182).

Performativity relates to teachers' productivity and the outcomes of their pupils (Ball, Maguire and Braun, 2012). Jeffrey and Troman (2011) claim that performativity exists within a perpetual and economically driven discourse of needing to achieve higher standards. Thus targets are set, reviewed and outcomes are presented in a competitive manner in order to increase productivity. Ball (2013: 102) refers to performativity in terms of the 'gaze of policy [which is] overbearing'. Accountability and performativity measures have been designed by governments to create a 'compliant profession' that accepts and enacts policy, according to Beck (2008: 138).

Pratt's (2016) research explored how neoliberalism and marketisation (sic) affected teachers' practice in terms of assessing their pupils' progress. Framing the research in the neoliberal context demonstrates the effect of an accountability culture in which teachers work and the pressure they are under to demonstrate that their pupils have made progress. Pratt (2016) argues that marketisation affects teachers who are in competition with each other within their school. He offers a social construction of how teachers worked towards meeting their 'professional expectations' (Pratt, 2016: 893). Policy enactment is briefly mentioned in the article. Pratt (2016) explores teachers' responses to policy change where pupils' progress was measured within and across years rather than at the end of each year. The accountability culture includes

the testing of pupils, schools' performance being published in league tables and the publication of Ofsted inspections.

Pratt (2016) refers to the neoliberal ideology in terms of the government's management and control of teachers. The NS were evidence of teachers being told how to teach as well as what to teach accompanied by the idea that teachers would be motivated to raise standards by the publication of the national test results. Teachers work in a culture of competition, i.e. their pupils must attain more than their colleagues' (Pratt, 2016). Teachers' performance management is based on the outcomes of their pupils' progress and there are financial benefits for teachers who achieve their targets.

Pratt (2016) analysed the teachers' responses using the following premises of marketisation:

1. Markets operate in terms of the purchase and sale of services or goods.
2. All employees need to share the vision of the need for the services or goods and be motivated to generate profits.
3. Customers should be convinced that their purchases were needed.

The author argued that teachers' assessments of their pupils became more 'visible' within their practice of marking pupils' work. Teachers' comments were designed to show the SLT and other colleagues that their pupils had made progress in measurable terms (Pratt, 2016: 896). Teachers met with members of the SLT to discuss pupils' attainment data and demonstrate their achievements.

According to Pratt (2016) assessment became a commodity that could bring financial reward to teachers when they demonstrated that their pupils had made the required amount of progress. Teachers benefitted from having lower attaining pupils in their class as there was a greater capacity to show how their performance had brought about pupil progress. Teachers were willing to be part of the market as they perceived that the stakes were worth achieving (Pratt, 2016).

Pratt's (2016) research clearly demonstrates how marketisation affects teachers' practice as they want to succeed. He referred to autonomy in a paradoxical sense as schools were free to manage their teachers yet they had to meet nationally set targets, which limited their actions to the performative practice of their teachers. Pratt (2016) cautiously agrees that neoliberalism can

be successful, it can ‘drive up standards’ of teachers’ performances and pupils benefit as they make progress.

However, not all teachers were motivated by the focus on pupils’ progress and the narrowness of their accountability. Data do not represent individual pupils. Pratt (2016) alludes to teachers’ motivation being affected by their perceptions that their pupils became data that were measured in terms of their teaching performance.

To summarise, professionalism (including new professionalism) refers to a group of people who achieve and maintain professional standards. Professionals are autonomous, they collaborate with peers, engage in professional development and are secure in their PCK. In contrast new professionals may lack autonomy and may be less inclined to collaborate as they are managed by policy. Teachers work within a culture of accountability and performativity that governs their actions and can affect their professionalism.

2.4 Key policy events in England

I now focus on two key policy events that relate to my research study as they affected mathematics teaching in English primary schools. My review starts with the NC that was introduced in 1989 and I focus on the 2013 NC in greater depth. I briefly mention the National Numeracy Project that preceded the NS before I discuss the National Strategies that were in situ from 1997-2011 and include the NNS and PNS. I present the government’s perspectives of the policy along with academics’ viewpoints and research findings. Teachers’ responses to the NNS relate to PCK and professional development, which I discuss.

2.4.1 The National Curriculum - a statutory policy document

The first NC was introduced following the Education Reform Act of 1988 that stated the need to unify the nation’s schools and reduce the element of schools’ differentials (HMSO, 1988). Previously teachers were free to create and deliver a school curriculum, which led to inconsistencies of school curricula and pupil attainment (Helsby & McCulloch, 1996). The government stated the trajectory in terms of the teaching content and pupil attainment that teachers in England were required by law to teach (Beck, 2008). The government’s intention was to unite teachers’ practice and subsequently raise standards (Ward & Eden, 2009). Barber (1996) advocates that the NC was needed to specify the knowledge and skills in accordance with the

nation's future needs in terms of having an educated workforce. The NC outlined the expected attainment for age groups but did not state the teaching methods (Askew et al, 2001).

Teachers claimed that they had been de-professionalised through the provision of subject content and they could no longer teach what they perceived relevant or what they had been passionate about (Garratt and Forrester, 2012). Helsby and McCulloch (1996: 62) report that the NC superseded teachers 'authority and expertise'. Teachers could no longer create their own curriculum, instead they only had to deliver a centrally controlled policy. The feeling of de-professionalisation continued when the 1999 version of the NC contained national attainment targets (Ozga, 2000). These attainment targets were progressive and outlined pupils' expected progression (Brown, 2010).

The NC has been subject to three reviews since its introduction, reflecting a change in government and/or the current and projected global economic situation of England. Changes were made in order to improve pupils' educational performance, e.g. in 1995 the NC content was reduced in order to focus in greater depth on fewer concepts (Webb & Vulliamy, 2007). The NC was reviewed in 1999, two years after the New Labour government came into office and in 2013 following the newly elected Conservative and Liberal Democrat Coalition government in 2010. These NC reviews show how political actions frame policy changes, to which teachers have to respond. The idea of policy change is at the heart of my research study due to the impact upon teachers' daily mathematics teaching.

Prior to the introduction of the 2013 NC the government conducted a review of mathematics and reported the following issues. The performance of 10, 14 and 15 year olds in the PISA tests had 'stagnated' and employers were saying that mathematics (and science) needed to be 'promoted in schools' (DfE, 2013a: no page number). The number of pupils who chose to go on to study A level mathematics was 20% in England compared to 85% in Japan. Pupils who did not gain a GCSE A or A* grade could not study at A level and there was no alternative course. England ranked 39th (out of 42 countries) in terms of the number of annual teaching hours given to 14 year olds (116 hours). In Chinese Tapai pupils studied for 166 hours. As a result of this review policy reforms were introduced to address the issues. The then education minister Michael Gove advocated the need for pupils to accelerate further in terms of known concepts. Thus the 2013

primary NC includes learning objectives that had previously occurred in the secondary Curriculum.

The mathematics learning objectives in the previous NC spanned 16 pages and included broad learning objectives such as ‘use written methods to add and subtract positive integers less than 1000’ in key stage two (DfEE, 1999: 69). The PNS provided additional guidance that broke the broad learning objective into smaller, progressive steps, e.g.:

- In year three ‘develop and use written methods to record, support or explain addition and subtraction of two-digit and three-digit numbers’ (DfES, 2006: 76).
- In year five ‘Use efficient written methods to add and subtract whole numbers and decimals with up to two places’ (DfES, 2006: 80).

These steps facilitated pupils’ understanding of written methods along and addressed the progression related to calculations. Teachers were also guided in terms of contexts in which pupils could apply the concepts of addition and subtraction.

Ineson (2014) warns of the loss of pupils’ relational understanding through a NC that focusses on the completion of calculations rather than progressing from mental calculations to informal and formal written calculations, which enable pupils to make connections between numbers and calculations. In the 2013 NC mathematics spans 43 pages and contains learning objectives such as ‘add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction’ in year three (DfE, 2013: 115). Addition and subtraction of fractions did not appear in the previous NC. A new learning objective is to ‘add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]’ in year three (DfE, 2013: 20). This comparison illustrates the government’s aim to increase the level of challenge in the NC (DfE, 2013a). There is an emphasis on teaching mathematics ‘as a set of absolute truths and rules’ (Ineson, 2014: 73).

The NC underwent ‘major revisions’ with regard to its subject content, according to Roberts (2018: 3). The intention was to create a ‘world class education system’ which would entail schools adopting ‘a radically and more rigorous approach’ (Gove, 2011: no page number). The government looked to pacific rim countries who performed well, e.g. Singapore and China.

Despite the teaching and learning culture within the pacific rim countries being different to that in England the government proposed that successful practices should feature in the English NC (NCETM, 2014). High expectations were set in an attempt to increase the attainment of English pupils in the government's response to the decline in standards of PISA test results. For example, pupils are expected to know the times tables (up to 12x12) by the end of year four, which is two years earlier than previous NC expectations. Alexander (2012: 370) challenges the strong response to PISA results, arguing:

> Clearly, in an interdependent and competitive world it is useful to know what other nations define as 'essential core knowledge' in the school curriculum, but it is surely taking matters too far to ordain that because a sample of their 15-year-olds outperforms a sample of our 15-year-olds in the PISA tests those nations' accounts of 'essential core knowledge' should replace our own.

However, a change that did not resonate with Singaporean practice was the movement of learning objectives that had previously appeared within key stage three into key stage two. Fractions was a topic of particular concern. ACME (2013) warned that pupils would not have time to embed their understanding of what fractions are and how they operate (e.g. measure, operator, ratio) before undertaking calculations.

Lessons could be learned from international comparisons, however 'international curricula have sometimes been over-ambitiously or inconsistently interpreted' (ACME, 2013: 3). The English NC contains 11 subjects (the religious education curriculum is determined by the LA). Nine subjects appear in the Singapore curriculum and citizenship, which does not feature in the English curriculum is taught throughout the primary years. The Singapore curriculum contains a smaller number of mathematical learning objectives in order for pupils to attain depth and breadth of understanding. There are fewer learning objectives in the English key stage one curriculum, which can support teaching in greater depth (NAMA, 2015). However the greater number of learning objectives in key stage two led ACME (2013) to warn that there could be superficial coverage of the content rather than pupils gaining mathematics mastery. Hence, the English NC

could not facilitate similar outcomes to Singapore in terms of pupils developing a deep mathematical understanding due to the need to cover its content.

ACME (2013) recommended that teachers had access to professional development to support their teaching of the NC, e.g. examples, a glossary and a chart that outlined the progression of concepts. The government's recommendation that schools use a high-quality textbook implied that a purchased mathematics scheme was/is needed to teach the NC. As a result of this recommendation there appears to be a return of the days prior to the NS when there was a range of schemes used amongst schools that ACME (2013) state are of varying quality.

The government suggested that teachers should use a textbook to support their teaching for mastery (NAMA, 2015). Textbooks equate to mathematics schemes (ACME, 2013) and in 2016 the government recommended the following publications:

- Maths No Problem
- Inspire Maths
- Busy Ant Maths
- Shanghai Maths Project (Collins)

(DfE, 2016).

In 2018 the DfE revised their criteria for textbooks and the following textbooks were recommended:

- Maths No Problem
- Power Maths Key Stage 1
- Power Maths Key Stage 2

(NCETM, 2019a)

Schools can purchase alternative textbooks, however funding is available for one year for the government approved publications (NCETM, 2019a). Maths No Problem appears on both the 2015 and the 2018 lists however schools who made purchases based on the original recommendations may have been unsettled to learn that their textbooks no longer met the government's criteria. The range of textbooks available (and it is interesting that the schools in

my sample did not refer to any of those recommended by the government) suggests a range of approaches to the teaching of mathematics. There is the potential for inconsistent mathematics teaching across schools who have different textbooks. Schools working in close geographical proximity could be using different textbooks and therefore collaboration could be problematic. In addition, textbooks will be subject to interpretation by teachers. Although there is a professional development programme provided collectively by the DfE, the National College for Teaching and Leadership and the NCETM the training events focus on the recommended textbooks.

Mathematics mastery is a policy that accompanies the 2013 NC aimed at developing teachers' mathematics teaching and raising pupils' attainment (EEF 2015). The focus of mastery is for pupils to develop 'deep conceptual knowledge alongside developing procedural fluency' (NCETM, 2014: 2). There is no single definition of mastery, however there are many descriptions within the literature, which the following list demonstrates:

- Pupils can achieve through whole class teaching that includes a range of structures and representations (NAMA, 2016).
- Mastery is designed to facilitate a whole school approach to mathematics teaching and can reduce the attainment gap particularly for pupils from low socio-economic backgrounds (EEF, 2015, DfE 2019).
- Interventions should be undertaken to address pupils' misconceptions or develop their insecure understanding (NAMA, 2016, Flower, 2019).
- In order to develop fluency, pupils need opportunities to recall known number facts, such as times tables within a variety of tasks (NCETM, 2014).

The first three descriptions echo the policy messages that accompanied the NNS. Hence mastery policy appears to address ongoing concerns that have been in situ since 1999. The difference that occurs within the mastery agenda relates to how mathematics is taught (mentioned in the fourth description). Pupils are expected to gain fluency to enable them to recognise mathematical structures (NCETM, 2014) e.g. 24 is made up of 20 + 4. In addition, variation that is seen in a range of different models and tasks provides pupils with many opportunities to apply and consolidate their understanding. Mastery also entails pupils progressing through the NC at

the same pace and differentiation occurs through teachers' questioning, levels of support and pupil interventions, according to NCETM (2014).

In 2013 the government pledged £11m to mastery training to be managed by the National Centre for Excellence in the Teaching of Mathematics (NCETM). The NCETM is an organisation that is funded by the government to provide high quality mathematics CPD. Examples of its online resources are a monthly newsletter, research articles and a self evaluation tool, all of which are designed to improve teachers' practice and raise pupils' attainment (NCETM, 2014). There are currently 37 maths hubs in England and this number is likely to increase as more schools engage with the mastery training programme.

NCETM's (2014: 3) explanation of mastery approaches to the mathematics NC states, for example, that teachers need to have deep and secure mathematical knowledge and provide a 'variety of representations' within lessons. Greater detail regarding how teachers might adopt a mastery approach did not emerge until the following year when the teaching for mastery programme was introduced (NCETM, 2019b). Thus there was limited guidance when the NC became statutory in 2014.

In 2016 the government pledged a further £41m to extend the mastery training programme to 8000 English primary schools over the next four years. A press release stated that the mastery approach used in South Asian countries had been successful and the number of 'functionally innumerate' 15 year olds was 10% lower in South Asia than in England and Nick Gibb, the Schools Minister advocated the use of 'high quality textbooks' (DfE, 2016: no page number).

The CPD provided by the NCETM is as follows. Teachers liaise with a primary mastery specialist teacher, a class based teacher who is considered as an expert in terms of their own practice and the development of teachers. Working groups (also known as teacher research groups) are set up to include colleagues from six or seven local schools. Teachers observe the specialist teacher, discuss planning and teaching and take ideas back to try out in their own school (NCETM, 2019c). The mastery specialist teacher also visits teachers in their own schools to provide guidance.

There is an extensive range of resources on the NCETM website for teachers to use within their teaching, regardless of their involvement in the training. The availability of resources echoes the publications and online guidance that was provided by the NNS and the PNS. While the NCETM promote the use of a textbook their advice relates to which textbooks the DfE recommends as opposed to how they can be utilised. ACME (2013) recognises that schools' management of the use of textbooks requires professional development. Teachers could benefit from guidance in terms of how the textbook can support their school's calculation policy.

NCETM's (2019b) evaluation of the impact of mastery consisted of a research team who undertook lesson observations and interviewed teachers and pupils in 28 schools in England. NCETM (2019b) acknowledge the small sample and recognise that their findings cannot be generalised to all schools that are involved in mastery. The findings are that pupils are making connections in their understanding due to the increase in pupil talk and reasoning. Pupils are developing fluency and there has been an increase in their reasoning and understanding of mathematical structures. Teachers' practice has been enhanced through attending mastery training. The reduced focus on differentiation by ability means that low attaining pupils access the same learning as their peers and they are making progress. Teachers find it difficult when they perceive the attainment gap between low attainers and high attainers is 'too large' for mastery teaching to address (NCETM, 2019b: 11). Further challenges include the length of time teachers take to plan and there are times when they are uncertain of mastery approaches. There has been disruption of a whole school approach when NQTs or ECTs join a school (NCETM, 2019b).

Mathematics mastery is slowly gaining momentum. There are currently 5116 schools that have received training (NCETM, 2019b), which is approximately one third of English schools. The situation appears to be that the government are encouraging schools to adopt a mastery approach while stating that there is funding for half of England's schools (8000) to participate (DfE, 2016). This fraction of the number of schools that are engaging with the mastery training suggests that other schools are taking a different approach. Thus the enactment of mastery policy is gradual in terms of schools engagement, which is in stark contrast to the NS that were launched to all schools in England. It is interesting that there is a mixed message as teachers

and pupils have benefitted from adopting a mastery approach (NCETM, 2019b) yet there is no statutory obligation for schools to engage with teaching for mastery.

Mathematics mastery did not feature within my initial research design, neither did the 2013 NC. My interviews with the teachers took place in the first academic year in which the NC was statutory. Teachers did not discuss mastery (with the exception of Terry and Tracey who spoke of depth and breadth). However there was a sense of uncertainty regarding the teaching of the new NC, which I discuss in depth in chapter seven. Having briefly introduced the NC as a statutory policy document I now turn my attention to the non-statutory NS and start by reviewing the NNP.

2.5 The National Numeracy Project

Launched by the Conservative government in 1996, the National Numeracy Project (NNP) was a response to 'poor results in international comparisons' (Askew et al, 2001: 14). The NNP was the first indicator that the government turned their attention from the 'what' of teaching, i.e. the NC to the 'how' that focussed on classroom practice (Brown et al, 2000: 460). It was termed a 'pilot professional development project' and was intended to support teachers' mathematics teaching (Felgate, Minnis & Schagen, 2000: 164). The NNP expanded into the NNS. There was a change of focus from the policy being a form of professional development to containing 'prescription and top-down pressure' (Brown et al, 2000: 462).

The NNP introduced the teaching of mental calculations, a framework of learning objectives for each year group and 'an outline lesson template' (which became the numeracy hour in the NNS) (Brown et al, 2000: 460). Support was provided through a five-day training programme, newly appointed numeracy consultants and example numeracy lessons (Felgate, Minnis & Schagen, 2000). The NNP was positively received by teachers who felt supported by the detailed guidance and Ofsted who reported that classroom practice had improved (Brown et al, 2000). Increases in attainment of written and mental calculations were 'significant', according to Felgate, Minnis and Schagen (2000: 177). In contrast, the Leverhulme project reported that the 'major attempt at systemic change has had at most a small effect on attainment in most areas of numeracy' (Brown et al, 2002: 108). The tests administered in these two articles differed in accordance with the focus of the research. Pupils' attainment increased when the test focussed on mental

calculations, which reflected the introduction of mental strategies in the NNP (Felgate, Minnis & Schagen, 2000). The number-based testing within the Leverhulme project contrasted as there was a larger number of areas tested, e.g. mental, written calculations and word problems. The tests are not comparable, which explains the contrasting findings.

2.6 The National Strategies

The NS are the result of an expert working group who addressed a wide range of topical issues such as attainment, behaviour and attendance (DfE, 2011). Introduced in England in 1997 the NS aimed to gain an 'accelerated improvement in standards' and increase teachers' confidence in the curriculum areas of English and mathematics (DfES, 2006: 3). A national training programme was available to all schools. With regard to mathematics the NNS and the PNS contained specific guidance to improve teachers' 'pedagogy and subject knowledge' (DfE, 2011: 2). The NS was a result of the political landscape that introduced policy containing the government's perspective of effective mathematics teaching. Fullan (2016: 18) argues that the 'relentless commitment' to numeracy was a positive factor.

The government claimed that the NS would raise standards as it was 'one of the most ambitious change management programmes in education' (DfE, 2011: 3). In the same year that the NS were launched the white paper Excellence in Schools stated that raising standards was New Labour's 'top priority' (DfEE, 1997: 25). A target was set for 75% of pupils to attain level four in mathematics by 2002, which was a significant increase from the previous year where less than 60% of pupils attained this minimum requirement (DfEE, 1997). The new prime minister declared he would create a 'world class education service' (Barber & Sebba, 1999: 183). There would be 'unrelenting pressure' and support for teachers to improve their practice (DfEE, 1997: 11&12). The focus on target setting, the national target and the 'punitive accountability' culture decreased teachers' motivation and led to a short term focus (Fullan, 2016: 218).

The NS was cited as having a significant impact on the quality of teaching and pupils' attainment. In 2010, the NS achieved 'the best set of mathematics results ever' as

> 98 000 more pupils achieved level 4+, the standard expected, than in 1998. In addition, 83% of pupils made two or more levels of progress over Key Stage 2' (DfE, 2011: 12).

Unsurprisingly, as the NS was a new policy directive, there is an extensive amount of academic response and research, particularly in terms of the NNS, which I now address.

2.7 The National Numeracy Strategy

The NNS was considered by the government as instrumental for raising standards while holding teachers to account for the success of their pupils (Barber, 2001). The Numeracy Task Force's final report (published in 1998) emphasised the supportive role of the NNS in terms of providing training and guidance (DfEE, 1998). The Task Force stressed that it was not their intention that the NNS replace current practice but that it was intended to complement schools' existing practice regarding the teaching and learning of mathematics (DfEE, 1998). The report highlighted that schools should liaise with their LEA for guidance regarding their utilisation of the NNS. Appendix 12 contains a summary of the NNS policy documentation.

The NNS was instrumental in promoting a uniform approach to mathematics teaching (Ofsted, 2002). It enabled 'teachers to plan and teach the National Curriculum for mathematics in a way that develops pupils' numeracy skills to the full, using the methods that we have recommended as effective' (DfEE, 1998: 15). The policy suggested that teachers deliver the numeracy hour and it contained explicit direction regarding whole class teaching and learning rather than pupils working through a textbook or worksheet on their own (Askew et al, 2001). Adams (2014: 63) summarises the NNS as 'highly prescriptive' which resonates with the suggestion that the teaching of mathematics could be contained within a policy.

The numeracy hour introduced an increase in direct teaching time from 20-25% to 50% with whole class input followed by teacher-led group teaching and independent activities (DfES, 1999). Planning grids, with examples of models and strategies were provided to help teachers identify the coverage of topics and to recognise progression. The NNS Framework stipulated that the plans were examples 'not to be taught as a scheme of work' (DfEE, 1999: 38).

The NNS originated at the Department of Education and was sent to LEAs and primary schools in England (Brown, 2010), accompanied by three policy messages. First, the government recommended that schools incorporate the NNS into their mathematics/calculation policy (Bell & Stevenson, 2006). LEAs strongly encouraged schools who had experienced poor pupil performance to use the policy (Brown et al, 1998). In addition, the public were notified of the

launch via the press in which the then education minister David Blunkett announced an investment of £60 million in the NNS (Brown et al, 2000). The reference to the government knowing 'what works' (Webb et al, 2004: 90) is clear. New professionalism is evident within the following press release from David Blunkett:

> Numeracy is a vital skill which every youngster must learn properly. Yet for perhaps 30 years we have not focused on what we know works. The new daily maths lesson will ensure that children know their tables, can do basic sums in their heads and are taught effectively in whole class settings (Blunkett, 1999, cited in Brown et al, 2000: 463).

In the following section I review the effect of the NNS on teachers' professionalism, which I categorise in terms of PCK and professional development.

2.7.1 PCK

The three-part numeracy hour indicated a significant change to teachers' practice as it provided the structure of a mathematics lesson (Kyriacou, 2005). Mathematics lessons were divided into three timed parts, the mental oral starter (5-10 minutes), main teaching input (30-40 minutes) and a plenary at the close (10-15 minutes). The mental/oral starter focussed on number bonds and times tables and was designed to promote pupils' rapid recall of number facts (Brown et al, 2000). 'Direct interactive teaching' involved the teacher delivering all parts of the lesson to the whole class, including focussed input with a group of pupils (Brown et al, 2000: 461). The plenary brought the lesson to a close and included activities such as a review of the learning objectives or connections to other subjects.

The importance of mental mathematics, first raised in the NNP had been useful for teachers and gained momentum through the NNS' numeracy hour, according to Brown et al (2000). Ofsted (2002) reported that there had been improvements in pupils' use of resources, e.g. number fans or mini whiteboards and the next steps were for pupils to make jottings while calculating mentally. Brown, Askew & Millett (2003) examined teachers' responses and found that they perceived that pupils' mental calculations had led to higher attainment for their pupils. Teachers could explain the mental methods but seem to have taught them as discrete topics. They perceived that pupils

would select the method that they liked best rather than facilitate their understanding of which method would be most effective for the calculation (Brown, Askew & Millett, 2003).

The NNS stated that pupils should learn a range of methods and be strategic in their selection of the most appropriate method for a calculation (DfEE, 1999). There appears to have been an assumption that teachers would have been secure in their PCK. However, Brown, Askew & Millett (2003) argue that on occasion teachers adjusted their pupils' explanations to fit with the method they were teaching. Teachers who were insecure in terms of their PCK were unable to compare and contrast the different methods. Their reconstruction of policy involved first selecting the 'more immediately understandable aspects' (Brown, Askew & Millett, 2003: 17). Where teachers could not adapt their existing practice there was a need for professional development, e.g. how to develop pupils' strategic thinking (Brown, Askew & Millett, 2003).

With regard to positive responses to the NNS Brown, Askew & Millett (2003) report that the teaching of mental mathematics contributed to pupils' higher attainment and the LA consultant was valued. Where improvements were made and mathematics teaching was good there had been 'systematic approaches to the development of pupils' counting skills' (Ofsted, 2002: 9). Pupils were able to swiftly recall number facts and explain their calculations and teachers used resources in an imaginative way.

Ineson (2007) found that pupils who had been taught with the NNS throughout their primary education made good use of mental calculations. A comparison was made between pupils' performance in a test that was taken by year six pupils. The tests were undertaken at the end of the first year of the NNS and again in 2005 when pupils had been taught with the policy for six years. Pupils used a wider range of mental calculations in 2006, including compensation for addition and rounding numbers to a multiple of ten for multiplication (Ineson, 2007). There was an increase in pupils' accuracy of their written calculations, particularly when informal methods were used. Thus, the NNS had been instrumental in pupils' use of mental calculations.

Good whole class teaching sustained pupils' momentum by teachers' use of questioning, summarising and consolidating the learning. Whole class teaching raised the quality of teachers' input and pupils' engagement, according to Webb & Vulliamy, (2007). Guided group work provided focussed teaching and learning to a small group of pupils (Ofsted, 2002). Ofsted (2002)

claim that the NNS' training package improved teachers' subject knowledge and would continue to do so. The NNS was beneficial and helpful for experienced teachers, student teachers and NQTs (Basit, 2003).

There was some confusion regarding differentiation and teachers were concerned about how the needs of low attainers could be met through whole class teaching (Askew et al, 2001, Brown, Askew & Millett, 2003). Ofsted (2002) stated that teachers did not always promote pupils' explanations or use of jottings within their mental calculations. There were instances where teachers' use of worksheets and/or mathematics schemes did not always align with the method stated in the NNS. The plenary was not taught or when it was taught it did not re-focus pupils on the learning objectives or facilitate the teachers' assessment (Ofsted, 2002). Concern regarding policy that addresses teachers as a homogenous group was raised by Brown et al (1998: 378) who argue 'that ministerial desires for simply telling 'what works' are unrealistic'.

A mixed response came from Webb et al (2004: 91) who state that mathematics teaching had been enhanced due to teachers including mental mathematics and plenary sessions within the numeracy hour, despite perceiving that they had been 'clockwatching'. Sharing the learning objective with the pupils at the outset of the lesson and revisiting these in the plenary was effective, although it had initially been problematic due to time constraints and teachers' being 'over reliant on getting pupils to read out their work' (Webb & Vulliamy, 2007: 571).

Webb and Vulliamy (2007) explored teachers' responses to the NNS. The authors state that the NNS was a prescriptive policy reform that had to be implemented. There was a culture of low trust and the government believed that teachers lacked the expertise to teach mathematics (Webb & Vulliamy, 2007). Teaching became a technical task that involved the delivery of the government's instruction manuals. This negative reference to new professionalism altered when the authors learned that the policy had enhanced teachers' perceptions of their professionalism.

The researchers argue that the NNS had 'received overwhelming support' from teachers (Webb and Vulliamy, 2007: 567). The training had been beneficial, the Framework contained a wealth of PCK and teachers perceived that their mathematics teaching was more robust. Practical ideas such as displaying and discussing the learning objective, teaching the numeracy hour and an effective deployment of the teaching assistant were useful. Teachers' professionalism in terms of

their PCK and professional development was enhanced and I suggest this was due to their capacity to review and update their practice.

Although quantitative data were not provided Webb and Vulliamy (2007: 575) argue that teachers adapted the NNS to 'preserve existing practices' or 'change without commitment'. Preserving existing practice suggests that teachers prioritised their own practice (Ball, Maguire and Braun, 2012) and made minimal changes. In contrast, the teachers who made changes without commitment wanted to be seen to have enacted the policy even though it went 'over and against' their current practice (Ball, Maguire and Braun, 2012: 44).

The NNS was well received in terms of PCK. Pupils benefitted from interactive lessons that included teacher input (Ward & Eden, 2009). A range of teaching methods was provided for pupils to select from, which was useful following the initial confusion regarding how selections would be made (Brown, Askew & Millett, 2003). The mixed responses from Webb and Vulliamy (2007) demonstrate that regardless of their perceptions of why and how the NNS was introduced teachers implemented the policy, which led to an enhancement of their professionalism.

2.7.2 Professional Development

The NS was a 'professional development programme providing training and targeted support to teachers through a three-tier delivery model, comprising the DfE and its national field force, local authorities deploying their own advisers and consultants, and then schools and settings' (DfE, 2011: 2). Schools were funded in order to release teachers from their classrooms for the training (DfEE, 1998). School governors attended the compulsory training event along with head teachers, mathematics coordinators and class teachers. The nationwide training event was 'systematic and standardised' and to ensure a consistent approach there was a set of 'videos and transparencies' used by the trainers (Brown et al, 2000: 461). The 'centrally designed' materials were given to mathematics coordinators to disseminate the training to colleagues on their return to school (Brown, 2010: 21).

The training videos along with the NNS Framework were considered 'highly technocratic' by Ball (2001: 51). Technocratic implies that teachers were encouraged to utilise the folder and teaching methods within. The training was subject to a range of interpretations and some teachers perceived that whole class interactive teaching meant that they included more questions within

their lessons while others perceived that they should spend a longer period of time teaching the whole class (Brown et al, 2000: 468).

Ofsted (2002) reported a mainly positive impact of the NNS training. Local education authority (LEA) consultants 'played a key role' in the dissemination of the strategy's 'central messages' (Ofsted, 2002: 22). The training content was regularly revised to focus on different areas of mathematics teaching, such as problem solving and the three day programme increased to five days. Adaptations were also made to provide training for teaching assistants, early years teachers and those from overseas. The training was comprehensive in terms of facilitating teachers' understanding of the NNS and its utility.

Enhancements to teachers' PCK did not feature in the Ofsted report that measured the success of the training in terms of how closely schools enacted the NNS. Ofsted (2002) reported that effective head teachers led their schools in the direction of travel with the NNS. In addition mathematics coordinators were effective when they worked closely with the head teacher to bring about teachers' usage of the NNS, according to Ofsted (2002).

In contrast, three years after the introduction of the NNS Ofsted (2002: 22) reported that the training 'has not yet made enough difference'. The dissemination of key messages was not always effective when teachers returned to school. Mathematics coordinators were expected to disseminate the training they received to their colleagues, which had been problematic in four ways. First, the coordinators would have needed to be secure in their PCK (Millett & Johnson, 2000). Second, not all mathematics coordinators were confident to present to their colleagues within a staff meeting (Brown et al, 1998). Third, mathematics coordinators disseminated their interpretations of the training, which were influenced by their perceptions of its effectiveness. Brown, Askew & Millett (2003) assert that there was no guarantee that the training messages had remained consistent. Some mathematics coordinators were hindered in their leadership by poor communication or a lack of support from the head teacher, e.g. 'limited non-contact time to do the job effectively' (Ofsted, 2002: 21).

The focus of professional development in the literature is the national training events that included a three or five days attendance on a course delivered by LEA consultants. The training was regularly reviewed in order to provide a range of topics, e.g. problem solving. While Ofsted

(2002) reported positive responses, their focus appeared to have been the outcomes of the training, which focussed on teachers' usage of the NNS. Difficulties arose in the expectation that key messages from the training would be disseminated upon teachers' return to school. Brown et al (2000) suggest that teachers' professional development needs had not been met. Fullan (2016) argues that reforming policy needs to include capacity building, which consists of steps that gradually develop teachers' sustainable practice.

I continue my review of the NS by now focussing on the PNS.

2.8 The Primary National Strategy (PNS)

After seven years the NNS was replaced by the PNS. The PNS presented the message that progress had been made due to the use of the NNS alongside 'best practice seen in our most successful primary schools, which is ensuring high achievement for all children' (DfES, 2006: no page number). Although successful the NNS had not attained its target of 75% of pupils attaining level four (73% did attain level four), therefore the PNS was introduced. Teachers were shown effective ways of teaching, e.g. key questions that drew on research based pedagogy (DfES, 2006).

The government's rationale for the PNS was as follows:

> Since 1998, much progress has been made by primary schools in raising standards, drawing on the support of the National Literacy and Numeracy Strategies. However, despite the distance travelled national test results show progress is not being sustained across the board. We know more can be achieved and the Framework provides a fresh momentum for securing progressive gains (DfES, 2006: no page number).

Brown (2010: 23) states that there had been 'little potential left for greater control of the system' and therefore the focus of the PNS was planning. A substantial proportion of the PNS contained learning objectives that had been grouped into two to three week sequences of teaching, known as blocks of progressive planning (DfEE, 2006). An electronic format was provided that contained links to additional resources such as the interactive teaching programmes that contained models that could be manipulated. A new tranche of training also accompanied the PNS (DfES, 2006). The accompanying policy documentation is summarised in appendix 13.

The Guidance Paper – Calculation (the paper), published online by the National Strategies in 2007 summarises the PNS' 'renewed objectives' (DfES, 2007: 3). The Paper stresses that pupils need to know when to select a mental or written method of calculation, or use a calculator, according to the calculation that is being undertaken. Pupils also need to know why their selected method is appropriate. In this regard, the Paper restates messages that previously appeared in the NNS.

The NNS introduced an emphasis on mental methods. Pupils progressed onto using 'informal jottings' as they tracked their mental calculations using tools, for example the empty number line and the grid method. The NNS' publications include the following two booklets:

- The National Numeracy Strategy Teaching Mental Calculation Strategies Guidance for Teachers at Key Stages 1 and 2 (QCA, 1999a). This booklet consisted of 76 pages.
- The National Numeracy Strategy Teaching Mental Calculation Strategies Guidance for Teachers at Key Stages 1 and 2 (QCA, 1999b). This booklet consisted of 68 pages.

The noticeable difference in the Paper is that the number of methods in the PNS had been streamlined, which Thompson (2008a) argues was designed to prepare pupils for formal algorithms.

Most, but not all of the progressive steps from mental to written calculations that previously appeared in the NNS remain in the Paper. While the PNS did not include similar booklets additional resources were provided. For example, PDF guidance documents contain in depth explanations regarding how objectives could be taught along with examples for teachers to use and links to interactive teaching programmes. Pupils were still taught to explore different mental/written methods, e.g. counting on or back on an empty number line for subtraction. Progression was determined by stages of increased challenge rather than year group objectives (DfES, 2007). However the Paper's recommended notations for long division did not support pupils' mental calculations and the progressive steps were too demanding, according to Thompson (2008b).

The Paper proposes that a reduced number of methods for pupils to learn would ease the transition to a new school, which seems rather an arbitrary criterion to address. It seems that the

government wanted to increase the likelihood that pupils would continue on one progressive trajectory regardless of the school, or number of schools that they attended. Reducing the number of methods appears to be a supportive action from the government aimed at streamlining pupils' progression to written algorithms. While there were fewer methods in the PNS the focus on mental methods preceding written remained.

One theme is presented in the literature, which is blame.

2.8.1 Blame

Teachers were perceived as instrumental in the NNS' attainment target not being achieved (Garratt & Forrester, 2012). The NNS had been introduced as a means of support and the government's trust in teachers had broken down when the attainment target had not been achieved (Ball, 2001). The government suggested that teachers had not followed the NNS, unfairly blaming them rather than suggesting that other factors could have affected pupils' attainment (Brown, 2010). There was 'substantial evidence' that teachers had welcomed the strategy and had been following it (Brown, 2010: 22).

2.8.2 The removal of the PNS

Upon its launch the NS had been defined as a short-term programme designed to raise standards (DfE, 2011). The government claimed the NS had 'made a significant and positive imprint on the quality of learning and teaching in schools and settings' (DfE, 2011: 3). In 2011 the 'fixed-term intervention programme to secure improvements in standards' (DfE, 2011: 3) ended and the PNS was no longer current policy. Schools were encouraged to 'determine their own needs and to commission appropriate support' (DfE, 2011). Having had the NS guidance since 1999, teachers found that the NNS and the PNS documentation had moved to an archived website.

2.8.3 Summary of the two key policy events

In sum, the introduction of the NC and the NS had a significant effect on teachers' professionalism and their mathematics teaching. The 1989 NC was introduced in order to unify teachers' practice and facilitate a consistent trajectory of pupils' learning. The NC has been reviewed three times since its introduction unaccompanied by training for teachers. Changes to the NCs addressed the government's perceptions of what was needed for England's future economic success, reflecting the neoliberal culture in which schools operate. Teachers need to

respond quickly as recipients of the statutory NC and make changes to their mathematics teaching that will be judged by their colleagues, through Ofsted inspections and by the results of national tests. Thus, changes to the NC can be problematic for teachers.

Introduced by the government to raise standards the NS introduced detailed, supportive guidance for teachers. The NNS introduced the numeracy hour and increased the amount of time teachers spent teaching their class. There was an increased focus on mental mathematics. Five policy documents included the Framework that contained worked examples of calculations and a range of teaching methods, along with a vocabulary booklet, mental and written strategies and an exemplification of learning objectives booklets. A nationwide training programme accompanied both the NNS and the PNS.

Both policy events heralded a change to teachers' practice as they responded to PCK that was presented to them. There was no accompanying training with the first NC. The NNS training appeared to have delivered functional development (Evans, 2008) that involved teachers' enactment of the training messages and the NNS. The PNS focussed on planning and was introduced to further develop teachers' practice in order to raise standards of pupils' attainment. The NS ended in 2011 and teachers are currently teaching the 2013 NC. I revisit the NC and the NS in chapter three as I review teachers' enactments of the policies.

2.9 Summary

Policy brings about change and policy as a process recognises how text, and for example, MP's speeches affect teachers' enactments. Recontextualization occurs when policy is interpreted in different settings in different ways (Ball & Bowe, 1992, Ball, Maguire and Braun, 2012, Singh, Thomas & Harris, 2013). Teachers enact policy by interpretation, where they make sense of it and consider how their practice might change. Messages from colleagues (e.g. SLT members, LA consultants) affect how teachers translate policy, i.e. put it into practice. The reconstruction and remaking of policy occur when teachers select parts (or none) of the policy to present and they make changes to their practice. These four non-linear stages summarise Ball, Maguire & Braun's (2012) theory of policy enactment.

With regard to professionalism, teachers are autonomous, they collaborate with peers, they are secure in their PCK and they continue with professional development (Bottery, 1996).

Autonomous teachers, according to Pitt and Phelan (2008) are free to make professional judgements and act upon those judgements. New professionalism, which emerged in the 1990s reduced teachers' autonomy by managing their practice through policy (Hargreaves, 2000, Evans, 2008). The accountability and performative culture that teachers work in also contributes to new professionalism as they aim to meet government set attainment targets.

Collaboration is beneficial in terms of teachers gaining an understanding and/or consensus of opinion regarding their next steps in response to policy, according to Wideen, Mayer-Smith and Moon (1996). However new professionals who are expected to collaborate do not benefit as they see the process as a demand on their time (Hargreaves, 2000).

In order for professional development to be effective teachers need to learn new methods and approaches from experienced, knowledgeable peers (NCETM, 2009). Engagement with the training events, e.g. planning, teaching and reviewing a lesson is likely to result in changes to teachers' practice (NCETM, 2009). Evans (2008) refers to this active engagement as attitudinal development. In contrast, professional development that supports policy reform tends to be functional and temporary (Evans, 2008).

PCK encapsulates teachers' subject and pedagogical knowledge and equates to what Shulman (1986: 9) refers to as knowledge '*for teaching'.* PCK develops during teachers' ITE and involves the reconstruction of their mathematical knowledge into teaching, using explanations, models and so on. I separated PCK into mathematics specific knowledge and pupils' learning and attainment needs to distinguish between mathematical content and teachers' awareness of their pupils. PCK topics such as differentiation are underpinned by PCK parts e.g. mathematics concepts which I displayed in table 2.1.

I described two key policy events within this chapter, the introduction and reviews of the NC and the introduction and removal of the NS. The NC is reviewed when the government address the UK's economic situation or following a general election where a new government is elected. The NS, introduced in 1997 aimed to raise standards. Teachers were provided with an extensive range of PCK through the NNS' training, the Framework and the additional documentation (e.g. vocabulary booklet). Progress in pupils' attainment was made, however in 2006 the government introduced the PNS in an attempt to increase 'control' (Brown, 2010: 23) through the provision of

planning. Five years later the NS were removed as the government stated that it was time for schools to be autonomous with regard to their mathematics teaching.

There is an extensive volume of literature regarding the NC and the NNS. Less is known about teachers transitioning from one policy to another, as evidenced in my brief review of the PNS. New professionalism hints at the affect of policy on teachers. My research questions aim to address these gaps as I focus on the PNS as a pivotal policy. I explore teachers' responses to three different policy phases and I examine how their professionalism affected and was affected by their policy enactments.

Chapter Three – Theoretical considerations

3.1 Introduction

I drew on two theoretical frameworks to provide lenses for my research study. Ball, Maguire & Braun's (2012) framework for policy enactment provides four stages of potential teachers' responses. Burr's (2003) social construction theory facilitated my understanding of the teachers' construction of their professionalism. The aim of this chapter is to explain, justify and critique my selection of the theoretical frameworks.

This chapter contains three sections. First I introduce policy enactment theory by drawing on Ball, Maguire & Braun's (2012) work. Following this I review research that contains a similar or contrasting theoretical framework, which enables me to discuss the uses and limitations of the theory. The second part of the chapter contains a summary of research regarding teachers' professionalism that focuses on autonomy and their PCK. Thirdly, I draw on Burr (2015) to explain the theory of social constructionism. A review of the research that pertains to teachers' social construction of their responses to policy follows and I consider its uses and limitations. I bring the chapter to a close by explaining my use of the theoretical frameworks.

3.2 Policy enactment theory

Ball, Maguire & Braun's (2012) research spanned two and a half years between 2008 and 2011 with an aim of developing a theory of policy enactment. Research was undertaken in four case study secondary schools, focussing on the following policies; personalised learning, standards (i.e. gaining A-C grades in English and maths GCSEs) and behaviour management. Ball, Maguire & Braun (2012: 5) researched teachers' enactments of policy from the perspective of the school context and several policies that were 'clustered together'. Exploring responses to three substantive national policies, in situ at the same time, was uniquely new to the field of policy enactment.

The sample included 95 participants made up of head teachers, school bursars/managers, teachers, union representatives, support staff, LEA colleagues and numeracy consultants. Participants were interviewed and some classroom observations took place. The researchers also collected demographic data including pupils' 'performance profiles' and school based policies

(Ball, Maguire and Braun, 2012: 13). The schools differed in terms of the LEA they were situated and type of school, i.e. special school, academy, faith school and a single sex school.

Teachers come across policy at different times, for example two years after the policy launch, six years into its life span or following its removal, which affects their interpretations. Ball, Maguire and Braun (2012) argue that school contextual factors such as the location of the school, historic Ofsted inspections and changes to the teaching staff could also affect teachers' responses to policy. These points clearly show the relevance of context to teachers' policy enactment, which resonate with my research study to a limited extent. I did not explore context, however I recognise how a historic event such as the ISP could affect teachers' responses (see section 6.2.2). Enactment of policy includes teachers' considerations of their experiences and school contexts. A two-way relationship exists as teachers make sense of policy and policy makes sense of them in terms of the changes they make to their practice (Ball, Maguire and Braun, 2012). Teachers might find themselves under pressure to enact policy or select which parts of policy to enact.

3.2.1 Interpretation of policy

Interpretation relates to the language of policy, which teachers make sense of through their 'decoding' of a policy text (Ball, Maguire and Braun, 2012: 43). Teachers make sense of policy by considering what action, if any, they need to take. Teachers' interpretations will be affected by their 'policy biographies' (Ball, Maguire and Braun, 2012: 43) that include their previous policy enactments, possibly within different schools. They also consider their school's policy biography that focussed on different priorities at different moments in time (Braun et al, 2011). In addition, schools will have a 'position in relation to policy' (Ball, Maguire and Braun, 2012: 44) e.g. they may be responding to an Ofsted inspection and need to take certain actions. Therefore teachers will interpret policy in different ways at different points within their teaching career as they consider 'what else is in play' (Ball, Maguire and Braun, 2012: 44) in terms of their experiences, their current practice and their school.

Interpretation of policy relates to teachers' considerations and their making sense of policy. Translation on the other hand recognises how teachers' interpretations can be affected by the policy messages they receive.

3.2.2 Translation of policy

Translation relates to the language of practice where teachers put policy texts 'into action' (Ball, Maguire and Braun, 2012: 45). Translation of policy is tactical, e.g. teachers review the policy in terms of its relevance to their school. Following this review changes are made to the school's policy or a commercial scheme may be purchased to support teachers making changes to their practice. Teachers' translations of policy are affected by messages from colleagues within school meetings, lesson observations, the tracking of pupils' progress and other professional conversations (e.g. during a planning meeting). The messages teachers receive can be affected by others' values, for example, a head teacher might prioritise parts of policy. Ball, Maguire & Braun (2012: 45) refer to these communications as 'imperatives and exhortations' to get policy done. Competition with other 'classroom priorities and values' (Ball, Maguire and Braun, 2012: 46) can occur, such as the teaching methods they currently use and those suggested within the policy. The result of this competition could be that policy fits or will be made to fit with teachers' current practice.

3.2.3 Reconstruction and remaking of policy

Reconstruction and remaking of policy relate to what teachers do, i.e. their enactment. As teachers reconstruct policy they decide how they will 'enact or respond' which includes them 'producing, reviewing and updating' policy through their routines and actions (Ball, Maguire and Braun, 2012: 109). Their reconstructions are affected by their differing understandings of policy and their pedagogical approaches. The remaking of policy occurs within 'the pragmatics of practice' that is how teachers present their policy enactments (Ball, Maguire and Braun, 2012: 113). Enactment now has two applications. First as an encompassing term that includes interpretation, translation, reconstruction and remaking of policy. The second application is teachers' reconstruction and remaking of policy, changes they make to their practice (if any) and the potential resultant outcomes in terms of pupils and teachers' performance.

The key points from Ball, Maguire & Braun's (2012) theory are that teachers make sense and bring meaning to their policy enactment. Their responses are affected by their previous policy enactments and their current practice. School practices, i.e. staff meetings and lesson

observations can affect teachers as they translate policy and attempt to put it into practice. Policy enactments will be different as teachers select the parts of policy to enact and decide how they change their practice. I provide an extract of my analysis of a teacher's responses to show how I identified these stages of policy enactment (in appendix 1).

3.3 Policy enactment research

I now introduce and discuss key findings from the literature that resonate with Ball, Maguire & Braun's (2012) theory of policy enactment. All of the research studies that follow involve teachers' enactments, and some but not all relate to mathematics policy. I selected the articles in order to examine the authors' approaches to policy enactments.

Ball and Bowe (1992) refer to a policy process that includes the recontextualization of policy in schools. Their research examines teachers' responses to the first NC. The focus of my review is the stages of policy enactment. Parts of the policy process are defined as the following three distinctions of policy:

- Intended or official policy, i.e. the original policy created by the government.
- Actual policy, which relates to the wording within the policy.
- Policy in use. This is the range of teachers' responses.

The first two distinctions refer to policy makers and writers' actions that take place before policy is received by teachers. There is a strong emphasis on teachers' interpretation of policy within the third distinction. I suggest that changes were made to Ball and Bowe's (1992) original ideas. For example, what is included within teachers' translation of policy went on to be included in Ball, Maguire and Braun's (2012) theory.

Ball and Bowe (1992) state that teachers' interpretations of the NC involved them making sense of the text, considering their current practice and the changes they might need to make. Their interpretations were affected by external messages, such as press coverage of the NC and the teachers interpreted the NC in different ways.

Ball and Bowe (1992) argue that senior teachers' interpretations of the NC affected the messages they passed on to colleagues. Heads of departments made decisions regarding how they wanted their subject to be affected by the NC. A head of science reviewed his curriculum and made

changes to incorporate the NC's levels of progression. The head of mathematics at a different school favoured the use of the current scheme and did not want to make changes. This idea developed into Ball, Maguire & Braun's (2012) translation of policy.

Interestingly, Ball and Bowe (1992) refer to policy implementation as problematic as teachers respond to policy in a range of ways. I suggest that the authors signposted the ideas of reconstruction and remaking of policy when they argued that policy is 'recreated' and 'produced' (Ball & Bowe, 1992: 114).

Ball and Bowe (1992: 105) suggest that 'teachers' priorities, experience and professional expertise were set over and against the structure, content and progression of subject knowledge presented in the National Curriculum documents'. This point is in stark contrast to Ball, Maguire & Braun's (2012: 44) argument that policy may go 'over and against' teachers' current practice, which is indicative of how policy in recent times is perceived as more relevant than teachers' practice.

A message that seems appropriate within today's policy climate is directed at policy makers. Ball and Bowe (1992: 113) argue that there were assumptions that there is 'commonality, even sameness, among schools, that all are equally able to respond, equally prepared, equally resourced. That is clearly wrong!'.

Singh, Thomas and Harris' (2013: 467) Australian based research explored the recontextualisation of child protection and safety policies. Their data were gathered through semi-structured interviews with staff who look after abused children that inlcuded a church department focussing on child protection, a teaching union, a school professional development provider and a human resources officer from a department of education. These policy actors are referred to as 'mid-level policy actors' (MLPAs) (Singh, 2013: 468).

Singh, Thomas and Harris (2013) define recontextualisation as the decoding and recoding of policy that enhances or reduces aspects of policy in accordance with MLPA's perceptions of how teachers should respond. The research explored how the MLPAs' interpretations and translations of policy differed according to the agency/department in which they work. Singh, Thomas and Harris (2013: 466) refer to policy that could be 'adjusted and worked differently' according to the

MLPAs' current practice, which echoes Ball, Maguire & Braun's (2012) stages of reconstruction and remaking of policy.

MLPAs receive policy, interpret it and decide what should be addressed by whom, when and where, determining how teachers' practice should change once the policy arrives in school. An example of this shaping involves a human resources officer who interpreted that a policy (unnamed) referred to inappropriate behaviour but did not define the term. Hence the perception was that the policy was too broad to be effective. The officer arranged a training event for teachers and principals (head teachers) that translated the generic behaviour management ideas into school terminology. The training provided examples of how pupils might present inappropriate behaviour and advised schools regarding how their child protection policy could recommend actions for teachers and other adults in school. Policy was therefore shaped into a school pedagogic approach and the teachers' translation of the policy was affected by the additional detail received during the training. The policy received by teachers differed from the original due to the new policy messages that were applied during its recontextualisation (Singh, Thomas & Harris, 2013). Ball, Maguire and Braun (2012) refer to recontextualization as policy that is interpreted in new contexts and prioritised in accordance with teachers' current practice. Singh, Thomas and Harris' (2013) research develops this point by showing how the different contexts can be outside of the school, i.e. mid-level and that MLPAs affect the shaping of policy before teachers make their interpretations.

In terms of policy as a process these two articles highlight how policy received by teachers can differ from the policy makers' intentions. Recontextualisation involves others' interpretations and a resultant shaping of policy, which then affect teachers' translations. Both articles include teachers, SLT members and staff within education agencies or departments as policy actors. I now review mathematics policy enactment research and I continue to make comparisons with Ball, Maguire & Braun's (2012) theory of policy enactment.

Spillane's (1999) American based research focussed on teachers' responses to a mathematics reform that addressed teachers' pedagogy and their subject knowledge. Teachers' enactments are influenced by their 'will and capacity' to review their understanding of mathematics and change their practice in accordance with 'reformers' bidding' (Spillane, 1999: 157).

Between 1992 and 1996 teachers were working in a policy intense environment and experienced what Spillane (1999: 150) refers to as 'accountability mechanisms'. If 65% of pupils did not attain a satisfactory grading schools would lose their accredited status and funding would be reduced. Schools had to prioritise the policies that they perceived were useful in order to maintain their accreditation. Other policies were ignored. Ball, Maguire and Braun (2012) make a similar point when they refer to policy being current or no longer appropriate as policy is produced or removed in accordance with the government's current priorities. The two policies involved were perceived as providing PCK in terms of teachers' planning, topic coverage and potential problem-solving activities. Spillane (1999) refers to teachers' reconstruction of practice, which resonates with Ball, Maguire & Braun's (2012) reconstruction of policy in which teachers make choices regarding changes to their practice.

The two policies central to the research were the Michigan Educational Assessment Program (MEAP) and Michigan's Essential Goals and Objectives for Mathematics Education (Essential Goals). It is not known if the policies were statutory but teachers spoke of their perceptions that they should change their practice. The policies stated how teachers should move away from procedural teaching where pupils followed steps to achieve the correct answer and instead teach principled knowledge where pupils construct their procedures for problem solving (Spillane, 1999).

All of the 25 teachers perceived that they were teaching in accordance with the policy and agreed that the reforms should be enacted. Spillane (1999) discovered that four teachers were teaching principled knowledge as pupils were looking for patterns and discussing their findings as they solved problems. Ten teachers were teaching principled knowledge to an extent, with some pupil exploration but no problem solving and the lessons tended to revert to procedural knowledge. Some problem solving tasks were included in 11 classrooms where teachers taught procedural knowledge. The findings suggest that teachers' interpretations of what constituted principled knowledge differed according to their PCK.

The teachers' interpretations of policy, according to Spillane (1999) were reliant on them recognising how their practice might change, based on their understanding of the terminology within the policy, e.g. what it meant for pupils to problem solve. Language is a tool and Spillane

(1999: 155) argues that 'language mediates teachers' thinking and their enactment of reform'. Teachers will make their own meanings of language, e.g. problem solving may be considered as a word problem rather than a numerical calculation or a series of connected concepts that need to be applied in response to a complex situation. There was a range in terms of teachers' capacity to understand how they could teach pupils to make mathematical connections. The range of findings, despite the teachers' perceptions of their responses, echoes Ball, Maguire & Braun's (2012: 111) point that reconstruction of policy is affected by teachers' 'differences in understanding and pedagogy'.

Spillane (1999) refers to the differences in teachers' responses as zones of enactment. The extent to which teachers change their practice determines the enactment zone, rather than their perceptions of their enactments. The zones differ according to the level of collaboration with colleagues and the availability of professional development events. I start with the zone of enactment that Spillane (1999: 160) cites as most likely to involve change, that of the 'social dimension'. Teachers have conversations with colleagues and experts within and external to their school and school district, e.g. colleagues at university. Enactments are discussed in terms of the use of resources and/or potential changes to teachers' practice. Over time the conversations deepen according to teachers' understanding of the changes that occurred or could occur in line with the policy. Teachers trial ideas and reflect collaboratively on the effects, which clarifies their understanding of policy as well as emboldens them to continue their enactments. Teachers gain confidence through their collaboration and reflection that potentially develops their PCK.

A slightly less effective zone of enactment portrays teachers' individual enactments that are different from their colleagues. Spillane (1999) refers to a teacher who cited a lack of support from her peers and undertook her own professional development by attending conferences. The least effective zone of enactment is the individualistic and isolated zone. Within this zone teachers attend CPD events that reinforce the policy messages, e.g. a problem solving workshop. According to Evans (2008) these events lead to functional and temporary development. Teachers' passively engage with the workshops and while they are encouraged to try out ideas on their return to school they are limited in their actions. It is not surprising that this zone of enactment is

limiting as there is no motivation for the teachers, such as a follow up peer review, as suggested by NCETM (2009).

Teachers' reconstruction of the policy consisted of how they made changes to their teaching practice, i.e. the zones of enactment (Spillane, 1999). For example the use of stories to introduce problem solving. Ball, Maguire & Braun (2012: 109) state that teachers 'pick and choose' according to their current practice, school priorities and their pedagogical understanding. The three contrasting uses of reconstruction refer to teachers making decisions and both uses have the potential for teachers to change their practice. Spillane (1999) focussed on actions whereas Ball, Maguire and Braun (2012) consider the broader context in which teachers work (e.g. school priorities). All of the teachers within Spillane's (1999) took action whereas Ball, Maguire & Braun (2012: 109) include the option that teachers might 'ignore' parts of policy.

The findings show how collaboration and professional development, which are characteristics of professionalism, feature within teachers' reconstruction of their practice. Teachers' collaborative discussion affects their consideration of the expectations of the policy, their enactments and their 'beliefs, knowledge and dispositions' (Spillane, 1999: 164). The zones of enactment were differentiated by the extent to which teachers' collaborated and their resultant actions. Spillane (1999) suggests that collaboration is beneficial for teachers as they respond to policy, which resonates with the next research study regarding teachers collectively making sense of policy.

Coburn (2001) explored teachers' responses to a reading policy reform that was introduced in a Californian elementary school (pupils aged five to ten). Teachers constructed their understanding of policy through talk within their 'professional communities' (Coburn, 2001: 145). Within these communities are 'embedded contexts' that contained the norms of social encounters, i.e. who spoke to whom (Coburn, 2001: 147). This idea resonates with Ball, Maguire & Braun's (2012) point that schools' contexts are an affective factor in teachers' responses to policy. Coburn (2001) develops the theory through her focus on how teachers' practices and their views of policy affect the sensemaking outcome.

Coburn (2001: 145) refers to policy implementation rather than policy enactment and she argues that teachers make sense of policy as they 'interpret, adapt and even transform reforms as they

put them into place'. These three stages are similar to Ball, Maguire & Braun's (2012) four stages of policy and I associate them as follows:

Coburn's stage	Ball, Maguire & Braun's stage(s)
Interpretation	Interpretation and translation
Adaptation	Reconstruction
Transformation	Reconstruction

Translation of policy does not appear within Coburn's (2001) stages of policy implementation. I suggest that interpretation and translation both appear within the author's references to interpretation. Coburn (2001) states that interpretation occurs as teachers draw on their existing resources, previous practice and even their own reading experiences to make sense of policy, which resonates with Ball, Maguire & Braun's (2012) theory. 'Messages from the environment' (Coburn, 2001: 152) were received through CPD events, staff meetings and teachers' conversations with senior colleagues. Rather than discuss the policy with like-minded colleagues teachers spoke to a range of teachers. School leaders shaped teachers' sensemaking by privileging some messages over others as they focussed on meeting 'district standards' (Coburn, 2001: 161). Ball, Maguire and Braun (2012) refer to this prioritisation of policy messages in terms of recontextualisation of policy that affects teachers' interpretations. The potential for teachers' responses to be affected by their colleagues echoes Ball, Maguire & Braun's (2012) translation of policy.

Adaptation of policy occurred when teachers' individual interpretations of the policy were discussed and a shared (but not necessarily agreed) understanding developed. An example of this came from an observation of three teachers discussing the ways in which they record pupils' use of pictures and the decoding of text within their reading. Coburn (2001: 156) concludes that one teacher asserted his/her method 'and the group ended up doing running records on text excerpts without pictures'. Ball, Maguire & Braun's (2012) reconstruction of policy suggests that teachers select the parts of policy to enact or possibly ignore. The difference in Coburn's (2001) transformation of policy is that teachers' responded in a collective sense.

While collective sensemaking appears to have been beneficial for teachers' collective sensemaking of policy, there are limitations. Individual teachers followed a colleague's idea and therefore their sensemaking was superseded by the need for all teachers to enact policy in the same way. While school autonomy appears to have been achieved individual teachers' ideas were disregarded.

3.3.1 Policy enactment and teachers' autonomy

I now turn my attention to four pieces of research that pertain to how teachers' autonomy affects and is affected by their policy enactments. Within my discussion of the characteristics of professionalism (section 2.3) I drew on Pitt and Phelan's (2008) definition of autonomy, which is that teachers are free to make professional judgements that they then act upon. Berry (2012) considers the paradox of autonomy from the perspective of the freedom of teachers' choices. Berkhauser and Lesaux (2017) compare the autonomy of novice and veteran teachers. Robinson's (2012) perspective is that teachers make choices regarding the actions they consider appropriate. Perryman et al (2011) highlight the effect of pressure on teachers' autonomy.

Berry's (2012) research explored how schools operate within the neoliberal context of accountability and performativity where they are in competition with each other. The policy foci of Berry's (2012) research relate to the financial and operational incentives offered to schools to become an academy and the content of ITE. Once a school becomes an academy they paradoxically gain freedom from government constraints while continuing to work within a culture of testing and the publication of league tables. ITE students are encouraged to be creative while learning that to be successful and pass the course they must meet the Teachers' Standards.

Autonomy is defined as 'limited decision making from a narrowly fixed range of choices' (Berry, 2012: 399). Teachers have controlled autonomy, i.e. their choices are restricted by measures such as Ofsted inspections and the publication of league tables. Berry (2012: 399) argues teachers have 'freedom juxtaposed to measures that are, in practice, coercive'.

The article does not capture the number of responses and is limited in terms of the number of verbatim responses provided. Nonetheless Berry (2012) argues that teachers accepted the accountability culture in which they work. They were autonomous when they felt that they were trusted by their head teacher, which suggests a freedom to act. Teachers also said that they

were autonomous when they met their targets for pupil progress, which shows their recognition of how their actions are controlled.

Teachers cited a greater number of reasons for frustration that related to the focus on pupil outcomes. For example the need to overtly show pupil progress suggests that teachers' professional judgements were not trusted by their SLT (Berry, 2012). Teachers' autonomy was 'restricted by the downward pressure exerted upon them stemming from governmental decisions' (Berry, 2012: 404). The government 'vaunt the possibilities of freedom while maintaining a firm and directional hand over how teachers go about their professional duties' (Berry, 2012: 399). Teachers are free to act on their judgements so long as they achieve nationally set targets.

Burkhauser and Lesaux's (2017) perspective is that teachers' autonomy is bound by their capacity to use policy, their current range of resources and their context. The authors researched teachers' enactments of an academic language curriculum that aimed to develop pupils' use of vocabulary within their reading and writing. The policy was prescriptive, it contained a framework of lessons, plans and scripts. Their research was based in the USA and involved interviews and observations of six teachers of English in three middle schools graded as low, middle and high poverty by the authors. Teachers were categorised into novice or experienced in order to compare and contrast the teachers' policy enactments. Novice teachers had less than four years teaching experience and experienced teachers had taught for 12-30 years.

All of the teachers were bound by their accountability for their pupils' exam results, thus they 'read the curriculum through a lens imposed on them by the district' (Burkhauser & Lesaux, 2017: 306). Being bound suggests a reduced autonomy. However, both novice and experienced teachers made adaptations to the policy. For example a novice teacher encouraged peer talk and shared writing while an experienced teacher worked with a small focus group. This suggests that s/he was autonomous as s/he adapted the policy based on his/her judgements of what was needed for the pupils to do well in the tests.

Teachers at the 'highest poverty' school lacked autonomy (Burkhauser & Lesaux, 2017: 307). The principal expected the policy to be enacted without adaptation as it was perceived as a means to raise standards. There was capacity for teachers to adapt the policy in the other two schools and

teachers were autonomous regardless of their level of experience. Hence, policy enactments were determined by teachers' contexts.

Robinson's (2012: 232) research focusses on the construction of teacher agency, defined as 'the individual and collective actions of a group of teachers'. While I acknowledge that I have not explored teacher agency within my research study her research resonates with mine in many ways. Robinson (2012) refers to policy as a process that starts with the production of a policy text from government, is interpreted by teachers and ends with an outcome. Interpretations and outcomes will differ according to the teachers' responses.

A curriculum was introduced in 1998 stating learning outcomes and yearly levels outlining the developmental stages of progression (Robinson, 2012). In 2008 policy for writing pupil reports was issued detailing that pupils' attainment should be graded A-E and their ranking within the class should be presented. Conflict occurred as the grading system did not align with the curriculum's developmental stages and school funding was determined by teachers fulfilling policy requirements (Robinson, 2012).

The research was conducted in a primary school in Perth, Western Australia over a three-month period. The principal and 11 teachers were observed teaching and conducting informal conversations and they also participated in semi-structured interviews. Talking with the teachers enabled the author to co-produce their perceptions of the conflict between the policy and their practice.

Professional agency relates to power and control between teachers and policy reform (Robinson, 2012) resulting in teachers struggling as they consider whether and how they might change their practice. Robinson (2012: 239) argues that teachers struggled to reconcile policy with 'their particular pedagogy and the school's philosophy'. An example of a struggle comes from a teacher who said that reconciliation between the two policies cannot be done and he was frustrated. An additional struggle was the idea of grading and ranking pupils by their performance, which was counter to the ethos of a school that was child-centred and non-competitive. There is resonance here with Ball, Maguire & Braun's (2012) policy enactment theory that states that teachers mediate and possibly struggle over policy.

The stages of policy enactment suggested by Robinson (2012) are interpretation, translation, compliance and negotiation. Teachers' interpretations of the policy were affected by their 'beliefs and values' regarding the content of pupils' reports and their school's ethos (Robinson, 2012: 232). The idea of complying and negotiating with policy to secure funding featured within the teachers' interpretations. These terms are indicative of teachers' agency, i.e. the choices and actions they considered, which resulted in them teaching to the test, albeit with adaptations to address their beliefs and represent the ethos of the school. Robinson (2012: 237) suggested that the principal might have been a 'translator' of policy. It would have been helpful to know if the principal translated policy for his own policy enactment or if he was part of his colleagues' translation of policy. The reshaping of policy occurred when teachers made a partial enactment, they listed pupils' gradings on a separate sheet to their report, which was only shown upon parents' request.

Agency is 'about taking action (even if the action is passive) and making choices that change or maintain routines' (Robinson, 2012: 232). This definition of agency is similar to Ball, Maguire & Braun's (2012) reconstruction of policy. Robinson (2012) suggests that teachers' autonomy was paradoxical as they were free to make judgements yet their actions were bound by the expectation that the policy was enacted.

It is unclear how the teachers' responses show their professional agency. The role of the principal could have been developed in terms of his effect on teachers' interpretations of the policy. School context, i.e. the ethos of the school and the viewpoints of the teachers clearly affected their responses. Robinson (2012) shows how teachers struggle with policy when they feel compelled to enact despite being dissatisfied.

3.3.2 Autonomy and pressure

Perryman et al (2011) argue that teachers experienced pressure to increase pupils' GCSE achievements, which was compounded by the performative aspect of the publication of league tables. Drawing on data gathered from the four secondary schools cited in Ball, Maguire & Braun's (2012) work the authors explored the responses of mathematics and English teachers and an unspecified number of teachers with a position of responsibility, e.g. head teacher or a member of the SLT from four schools formed the sample. Perryman et al (2011: 183) examined

the ‘accommodations and conflicts’ that occurred as teachers enacted several policies at one time. The authors drew on Baker’s (2007) point that the publication of school league tables generates action. Saturday school and Easter holiday revision sessions were introduced for pupils who needed an additional boost in order to gain an acceptable grade. This measure was indicative of the pressure schools were under to increase the number of pupils attaining A* - C in five GCSE subjects.

During the 1980s teachers were accountable to themselves, their colleagues and their pupils (Perryman et al, 2011). Teachers are now new professionals who are managed by target setting and performance management and are accountable to the government and Ofsted. The teachers in this study experienced ‘unrelenting pressure to ‘improve’’ (Perryman et al, 2011: 182, inverted commas as original). Teachers had to take action to raise their pupils’ grades, which suggests a lack of autonomy.

Teachers’ autonomy, although not defined by the authors, was discussed in terms of their professional judgements and their capacity to take action. Teachers were affected by being under pressure and ‘reported loss of control, frustration at having to work to others’ agenda and a lack of creativity’ (Perryman et al, 2011: 187). The responses do not capture which policy/policies to which the teachers were responding. Their interpretations included their consideration of how they needed to make changes to their practice. An affecting factor was that there would be consequences should they not achieve their targets (although the authors do not explain what the consequences were). Teachers’ experiences and professional judgements made way for adherence to ‘the plethora of initiatives and intervention strategies’ (Perryman et al, 2011: 187). Thus, policy went ‘over and against’ teachers’ current practice (Ball, Maguire and Braun, 2012: 44). Translation of policy is ‘closely interwoven and overlapping’ with interpretation (Ball, Maguire and Braun, 2012: 47), which is evident within this research study. The sense of pressure experienced by members of the SLT affected the messages that they gave to colleagues and teachers spoke of an awareness of the pressure to raise standards.

An interesting perspective is that English and mathematics teachers gained leverage over the amount of teaching time allocated to their subjects. They could ‘demand resources’ as their results affected the whole school (Perryman et al, 2011: 189). When the two core subjects were

doing well they benefitted from fewer interventions from the SLT, i.e. as a subject department they gained autonomy. Perryman et al (2011) describe these findings in terms of teachers having power and being able to make judgements. Teachers who were meeting their targets were described as 'leading not following policy' (Perryman et al, 2011: 191).

3.4 Policy enactments and PCK

Basit (2003) explored teachers' responses to the NNS in terms of their PCK and the effect of the policy on their practice. Basit (2003: 62) referred to policy implementation, she referred to the NNS as a 'top-down initiative' that had to be actioned. Interestingly, Basit's (2003) sample did not include qualified teachers, instead 30 final year BEd students in North West England were selected. These students would have known no other way of teaching mathematics, as their ITE started in the same year in which the NNS was introduced. The students had not chosen to specialise in mathematics and would therefore have had a generalist provision of mathematics throughout their university course (Basit, 2003). The students were interviewed twice within a two-month period (it is unknown if this related to before and after a school placement).

The students made sense of the NNS in terms of its planning schedule and the numeracy hour. Positive responses referred to the mental starter and plenary that students perceived provided a coherent learning structure to their mathematics lessons. It seems that the students gained professional development from their engagement with the Framework in school, coupled with their ITE studies. Students referred to NNS in terms of its 'uncomplicated, yet detailed' guidance (Basit, 2003: 64). 'Many' said they had 'considerable training' while 'a few' had 'very little' at the university (Basit, 2003: 69). Therefore the practical enactments of the NNS appear to have enhanced their PCK. These students experienced a boost to their confidence.

In contrast, one teacher said that the NNS 'lacked applicability' as she did not agree with the suggested duration of topics. A further negative perspective was that the students perceived that the NNS demonstrated policy makers' limited understanding of how pupils learn, which Basit (2003) suggests is a result of the government's focus on external, economic factors. It is not known how many students had commented on this issue, it had been 'in the minority view' (Basit, 2003: 66).

3.5 Social constructionism

Burr's (2003: 5) theory of social constructionism is characterised by researchers adopting a critical stance towards taken for granted knowledge and avoiding making assumptions regarding 'the world or people'. People's perceptions of knowledge will be influenced by when and where events take place and their previous experiences. Knowledge cannot be imposed on others, it emerges and changes depending on the social practice in which it is created, thus it has historical and cultural specificity (Burr, 2003). This characteristic resonates with Coburn's (2001) idea of sensemaking, i.e. knowledge is sustained by the social process of collaboration. Knowledge and social action go together, i.e. the construction of knowledge leads to people taking action (Burr, 2015).

Language is a key feature of social constructionism, it 'constructs the world as we perceive it' (Burr, 2003: 46). Language is a form of social action in which knowledge is constructed through interactions between people and their talk. Knowledge therefore becomes a process, something that 'people do together' (Burr, 1995: 8). Language forms attitudes, opinions and motivation that do not exist separately. People engage in discourse that consists of conversations providing 'a frame of reference, a way of interpreting the world and giving it meaning' (Burr, 2003: 105). These points show how social constructionism can be an ontological stance. Researchers can explore the construction of knowledge through the language people use and the effect of their conversations.

Social constructionism provides a theoretical lens to understand how people construct an account and therefore their understanding of their experiences. In terms of my research study the theory helps me understand how people justify their version of events 'to suit particular purposes' or to maintain their credibility (Burr, 2003: 126). I am able to elicit a wide range of responses from teachers with different experiences, focussing on specific times within their careers (the three policy phases). I now review how social constructionism has been used in policy enactment literature.

3.5.1 Policy enactment and the social construction of professionalism

Helsby (1995) asked 15 secondary school teachers to explain their understanding of the term professionalism. Teachers perceived that they were not valued by the public due to reports in the

media. This example shows how teachers' constructions of their professionalism were affected by their perceptions of their reputation with the public. Teachers were also asked to respond to the NC, which led to the construction of two categories; being a professional and behaving professionally (Helsby, 1995). Being a professional includes the characteristics of having autonomy, knowledge and skills. Professionals offer a service to members of the public who have confidence in their expertise. Some teachers felt that there was a need for a professional body however they perceived that they were trusted (Helsby, 1995). Behaving professionally is shown by teachers who are committed, work hard and maintain high standards. Relationships with colleagues, pupils and parents are appropriate. Professionals respond to problems and continue to learn throughout their careers (Helsby, 1995). The categories of being a professional and behaving professionally were co-constructed by the author, from a wide range of responses. Thus there was no external reality of professionalism.

Helsby (1995: 324) did refer to the external reality of 'professional confidence', an objective term that she aligned to teachers' social construction of the effects of the first NC. Professional confidence relates to teachers having the capacity to make decisions regarding their responses to the NC. A connection between confidence and autonomy emerged when confident teachers were able to 'balance' the NC with their 'professional priorities' combining the NC with their current practice (Helsby, 1995: 325). Nonetheless, Helsby (1995: 320) argues that teachers can 'resist increasing state control of their work' as they socially construct their professionalism, i.e. they perceive they have autonomy. Ball, Maguire & Braun (2012: 138) however, argue that teachers' resistance to policy is 'rare and fleeting' due to the culture of accountability. These contrasting arguments demonstrate how teachers' perceptions of their accountability can affect their constructions of professionalism. Teachers who lacked confidence took on a 'passive role' that equated to being told what to do and therefore the NC superseded their current practice (Helsby, 1995: 325).

I now turn my attention to Webb et al's (2004) research. The study follows previous research that had taken place between 1994 and 1996 and explored teachers' responses to the NC. in 2001 Webb et al (2004) re-interviewed 23 teachers from six English schools and 12 teachers from six Finnish schools. The researchers also interviewed a head teacher from each country who had

not featured within the initial research study. Their findings show that teachers evaluated how professional they had become as they enacted the NNS. They also considered what the policy suggested in terms of the government's perceptions of their professionalism.

Teachers' professionalism was undermined by the NNS that inferred that 'teachers were people that needed telling what to do' (Webb et al, 2004: 92). They perceived that they no longer had to consider the learning and attainment needs of their pupils. The structure of the numeracy hour replaced their professional judgements. Collaboration with colleagues no longer seemed necessary as teachers perceived that their professional judgements had been replaced by the policy.

Hargreaves (2000) and Evans (2008) refer to new professionals as teachers who lack autonomy as they are managed by policy. Webb et al (2004: 90) develop this idea as they suggest that teachers comply with policy to develop their 'knowledge and skills according to government definitions of what works in schools'. Teachers could not be creative and spontaneous in their pursuit of pupils' interests. Preparing pupils for the national tests went against teachers' professional judgements yet became necessary because of the accountability culture in which they worked.

Observations by Ofsted inspectors, LA staff and SLT colleagues focussed on teachers' enactments of the policy. Teachers felt that they were not trusted by the government and the culture of observations was needed to ensure that they were enacting policy. Professional development was contentious as teachers recognised the training they received involved 'government determined competencies, and skills' (Webb et al, 2004: 96). An example of a government set standard is the qualification for head teachers. Teachers perceived that the professional development opportunities that met their own needs was limited. Nevertheless some schools were autonomous and they provided training that addressed their interests and/or their pupils' needs.

Teachers' PCK was enhanced by the NNS, which increased their confidence 'to explain precisely what they were doing and why' (Webb et al, 2004: 92). A further positive point is that the focus on data and raising standards helped teachers align their assessment and planning appropriately. Teachers were empowered when they perceived that professional development events

addressed their individual, class based needs. Thus teachers' PCK was enhanced, which meant that they were able to teach mathematics effectively and their pupils benefitted.

The researchers conclude that 'the concept of teacher professionalism is best viewed as a social construction that is used by different groups as a mechanism of political and ideological control' (Webb et al, 2004: 100). Teachers recognised that their professionalism was boosted by policy, e.g. they gained an enhanced PCK. Conversely they can be undermined when they perceive that policy has to be enacted despite their professional judgements, e.g preparing pupils for their national tests. These perspectives affected the teachers' perceptions of how the government views teachers' professional practice. The contrasting constructions reinforce Burr's (2003: 204) argument that there is no 'ultimate truth' to be discovered, 'all perspectives are equally valid'.

Biesta, Priestley and Robinson (2015) analysed teachers' responses to the new curriculum in Scotland, the Curriculum for Excellence (CfE), which was introduced in 2010. Teachers and senior managers from three schools were interviewed, lessons were observed and policy texts analysed. The researchers explored teachers' agency, which is affected by their previous experiences, their current practice and their future perspectives. Teachers' agency is rooted in their beliefs, which are temporal and 'affective' (Biesta, Priestley & Robinson, 2015: 628). These two points echo the temporal dimension of policy enactment. Agency governs what teachers do and the authors examined teachers' professional judgements. They found that agency was underpinned by the teachers' perceptions of their pupils' learning and attainment needs and their role within the school and the wider context of education.

Teachers constructed their professionalism in terms of their responsibility to meet their pupils' learning and attainment needs. They interpreted the CfE by considering their pupils' capabilities, which presented a juxtaposition when the curriculum was perceived as too challenging. Some perceived that they had to teach the curriculum regardless of their pupils' capabilities. One teacher considered that it was her responsibility to adapt the curriculum in order for her pupils to access the learning. Biesta et al (2015: 636) argue that teachers were new professionals whose judgements were based on 'superficial understandings' of school practice and the role of policy. Teachers were unclear of their responsibilities, which included responding quickly to policy and focussing on short-term goals.

3.5.2 The social construction of policy enactment

Maguire, Braun & Ball (2015) examined policy actors' social constructions of their policy enactments. The authors drew on the responses from Ball, Maguire & Braun's (2012) four school case studies (discussed in depth in section 3.2). The construction of policy enactments was co-produced by the researchers during interviews with teachers, leaders, school bursars, teaching assistants and LA advisors (policy actors).

Maguire, Braun and Ball (2015: 486) state that 'policy enactment is a social, cultural and emotional construction'. This reference to school contexts resonates with Burr's (2015: 3) 'historical and cultural specificity', i.e. when and where events take place. A further similarity is that policy actors' relationships with their colleagues are 'social processes' that construct knowledge between people and lead to social action (Burr, 2015: 4). Maguire, Braun and Ball (2015: 488) argue that 'depending on the perspectives, values and positions of different types of policy actors and different types of policies, as well as grounded factors of time and place, enactments are contingent, fragile social constructions'. They created a framework of school-based factors that suggest how and why policy actors might respond to policy.

Maguire, Braun & Ball (2015) do not explore the use of language, instead they present the policy actors' responses verbatim and interpret their meaning. Burr (2015) argues that verbatim responses should be presented to provide context and demonstrate people's different perspectives of their experiences. There is no 'ultimate truth' to be discovered as 'all perspectives are equally valid' (Burr, 2003: 204).

Teachers' perspectives are affected by their different 'beliefs and values' (Maguire, Braun & Ball, 2015: 491). Previous experiences and the position they hold within the school affect their responses. For example, a non-teaching, senior pastoral leader whose background was counselling and psychotherapy spoke of pupils taking ownership of their anger in order to modify their behaviour. A deputy head teacher briefly mentioned dealing with issues and she prioritised the importance of preparing pupils to be successful.

Interpretation of policy is influenced by teachers' perspectives, i.e. a member of the SLT will make sense of policy in a different way than a NQT due to their contrasting levels of responsibility (Maguire, Braun & Ball, 2015). NQTs comply with policy as it is seen as useful guidance while

they focus on classroom 'survival' (Maguire, Braun & Ball, 2015: 495). Nonetheless it is unlikely that NQTs enact original policy as they are translators of the policy messages provided by senior teachers within their department.

There are different 'orientations' of teachers according to whether the subject they teach is high or low stakes (Maguire, 2015: 490). Mathematics is a high stakes subject and therefore teachers are under pressure to raise attainment, their outcomes affect the school's league tables and the results of Ofsted inspections. The practical considerations relating to time/space' in which to 'conduct policy' (Maguire, Braun & Ball, 2015: 492) are also a factor. Mathematics teachers were able to negotiate prioritised timetabling, arranging for the GCSE cohort of pupils to be taught on the same day, which facilitated focussed input that benefitted pupils (Maguire, Braun & Ball, 2015).

3.6 Critiques of social constructionism theory

Social constructionism theory states that there is no objective reality and that 'language constructs the world as we perceive it' (Burr, 2015: 52). People create meaning through the social process of talk and language is used to construct knowledge and demonstrate their realities of the world. This anti- realist stance is questioned by Nightingale and Cromby (2002) who question how language can be the only measure of knowledge. As 'language performs flawed, incomplete reference' it cannot mirror what exists, there may be errors in people's perceptions (Nightingale & Cromby, 2002: 705). In addition, Nightingale & Cromby (2002: 706) do not accept that claims of knowledge can 'always be reduced to social convention' (i.e. talk with others).

There is scope for inadequacy of accounts due to people's capacity to use language to account for and describe their world and therefore language cannot constitute reality (Edley, 2001). For example, one could refer to a mountain in terms of driving through a tunnel, its height, how it can be ascended or descended or the wildlife that live on its slopes. Someone who has climbed the mountain will describe it in a different way to the person who rode a train to its peak. The mountain might be Mont Blanc or Mount Everest, yet mountains will be mountains regardless of their names and how they are described.

Social constructionists find it difficult to claim 'there *really is* nothing outside of talk (Edley, 2001: 437, italics as in original). The reality of a feeling such as guilt exists so when people talk about

feeling guilty they are referring to an ontological construction of their understanding (Edley, 2001). Nightingale & Cromby (2002: 710) suggest adopting a 'critical realist ontology' in which references to reality are accepted and objective knowledge is recognised (to a limited extent) that can strengthen claims of truth. Social constructionism can therefore become the epistemology, i.e. how we know, by offering a framework in which to examine people's accounts of their experiences, not just the outcome (Nightingale & Cromby, 2002).

Nightingale and Cromby (2002) question how social constructionist research can offer truth when an external reality is not acknowledged. Drawing on their case study of the case of James Bulger, the authors developed the idea that Robert Thompson and Jon Venables socially constructed their personal subjectivities. Their subjectivities intertwined the external reality of their violent, unstable upbringings with their understanding of what childhood was (Nightingale & Cromby, 2002). Behaviour is learned 'guided by rules and conventions' and brings about an action and/or a response (Liebrucks, 2001: 380). The case study highlighted how there was more than language in their constitution of the world. The process of social constructionism became the ontology, i.e. what knowledge is, the 'processes that shape our subjectivities' or inform an account (Nightingale & Cromby, 2002: 710).

3.7 Summary

Ball, Maguire & Braun's (2012) theory was evident within the policy enactment research that I reviewed. My review highlights the stages that teachers experience as they enact policy. A common finding is that teachers have different considerations and receive policy messages that lead to a range of responses to policy.

When secondary school teachers received the first NC Ball and Bowe (1992) explored their responses. The teachers asked how could the policy fit into their current practice, did they need to make changes, what is currently happening in their department? By examining these considerations Ball and Bowe (1992) recognised that on receipt of policy teachers make sense of policy in terms of their current practice. Teachers had individual perspectives, which were captured within the encompassing term of interpretation of policy as a stage of enactment.

Singh, Thomas and Harris (2013) built on the idea of interpretation when they recognised how policy actors from different contexts shape policy. MLPAs made modifications that were

communicated to teachers. For example, a human resources officer arranged training for schools that supported a policy's general behavioural management guidance. The policy teachers received included specific guidance regarding recognising and addressing inappropriate behaviour. The authors referred to recontextualisation, i.e. the interpretation of policy by different policy actors who have different priorities and perspectives. The policy received by teachers was different to the original, which would have affected their interpretations of policy. Ball, Maguire and Braun (2012) state that teachers' translation of policy can be affected by messages they receive at a training event. Singh, Thomas and Harris' (2013) research clearly shows how teachers' translations of policy can differ according to how the policy was shaped by a preceding policy actor.

Spillane (1999) makes a specific point that teachers' enactments of a mathematics policy were determined by their PCK in terms of understanding the policy. Translation of policy included collaboration with peers and an engagement with professional development. Thus, the reconstruction of policy, which Spillane (1999: 157) refers to as zones of enactment was determined by the extent to which teachers had the 'will and capacity' to change. The mathematical context showed how teachers' policy enactments affect and are affected by their professionalism.

The literature shows that autonomy is paradoxical. Teachers can make professional judgements, as suggested by Pitt and Phelan (2008) but there were few occasions where they could take action. Berry (2012) refers to teachers' autonomy as limited and controlled as their actions are governed by policy and they need to meet their attainment targets. Teachers' adaptations to an academic language policy differed according to their experience and the context of their school. Their actions were bounded by the need to meet the district standards (Burkhauser & Lesaux, 2017). Robinson (2012) highlights how teachers' choices are affected by their values, beliefs and the ethos of their school, which are superseded by the need to enact policy to secure funding. Perryman et al (2011) introduce the idea that pressure can lead to teachers being autonomous when their department is achieving its targets or conversely lacking autonomy and having to follow policy.

The social construction of professionalism appears in different ways, which supports Burr's (2015) theory that there is no objective reality. Confident teachers who are secure in their PCK are autonomous, whereas teachers who lack confidence are passive in their responses to policy (Helsby, 1995). Webb et al (2004) argue that collaboration became unimportant when teachers' perceived that the NNS contained the PCK they needed. However teachers' PCK was enhanced by their enactment of the policy. New professionals lacked autonomy due to the accountability culture, which meant that they prepared their pupils for the national tests despite being dissatisfied with their actions. Opportunities for professional development were limited as training events addressed the need to meet national standards and the government's attainment targets. However some schools were autonomous when they provided additional training events that addressed school based needs (Webb et al, 2004). Biesta et al's (2015) findings show how teachers' construct their professionalism in terms of their perceptions of their pupils' capabilities juxtaposed with their role as a teacher. New professionals appear to be restricted in their autonomy as their understanding of the purpose of education was limited to short term responses to policy.

Teachers' responses included a wide range of ideas regarding what professionalism is and how they are professional. The commonality amongst social constructionism research is that patterns are found within the data. In some instances the researchers discuss the external reality, i.e. PCK, which is documented in the literature (e.g. Helsby, 1995 & Webb, 2004). The teachers' perceptions of their professionalism emerge from the data, they are constructed by the researchers.

Maguire, Braun and Ball's (2015) article provides a framework in which policy actors enact policy. The framework includes policy actors' experience, their position within the school (teaching, non teaching for example), their responsibility (E.g. NQT or senior teacher) and the status of their subject (high or low stakes).

Social constructionism has been critiqued due to the limitations of people's use of language (Edley, 2001). Nightingale and Cromby (2002) argue that external realities do exist and will affect people's understanding of the world. People's perceptions of the world are affected by their education, geographical location and their experiences (Liebrucks, 2001). Nevertheless, the idea

that people talk about their experiences and construct their understanding enables the researcher to present unique perspectives.

Chapter Four - Research methodology

4.1 Introduction

Within this this chapter I explain and justify my decisions regarding my research methodology. I undertook my research in the interpretative paradigm using a qualitative methodology and I conducted semi-structured interviews. I discuss the methodological considerations of drawing on social constructionism theory. I explain how social constructionism underpins my ontological and epistemological perspectives. I explain my sampling process and provide information of the 29 teachers from five schools in a London borough. Following this my data collection and analysis are discussed along with my reflections of what I consider to have been a rigorous and robust process. Ethical considerations follow, along with a discussion of my positionality within the research process. Throughout the chapter I reflect on my decisions and explain the processes that I consider led me to a clear methodological approach to my research study.

My research study relates to primary teachers' reflections of the mathematics policy within each of the three phases and their perceptions of their responses. I wanted to gain an understanding of how teachers' policy enactments affected and were affected by their professionalism and the effect upon their teaching of mathematics. My research questions are:

1. What are primary teachers' reflections on their responses to three phases of the Primary National Strategy (PNS)?

2. What are their perceptions of the effect these responses had upon their experiences of teaching mathematics in the following phases?

- Phase one – Prior to the launch of the PNS
- Phase two – During 2006-2011 while the PNS was current policy
- Phase three – Following the removal of the PNS

3. How are responses similar or different between each phase and within the phases?

I now discuss the interpretivist paradigm.

4.2 The Interpretivist paradigm

A paradigm is 'an agreed-upon conceptual framework' within which researchers operate (Hartas, 2010: 16). The interpretivist paradigm enables researchers to make meaning from participants' 'interpretations, perceptions, meanings and understandings' (Mason, 2002: 56). There is a connection between interpretivism and Burr's (2015) social constructionism theory as people (teachers) construct and reconstruct their understanding of the world and are influenced by the time and place they experienced various events.

The researchers then interprets the teachers' responses and their findings are affected by their experiences and beliefs (Lincoln, Lynham and Guba, 2011). As Corbin and Strauss (2015) argue, data may be interpreted a different way each time it is analysed by the researcher. Drawing on the theoretical framework of policy enactment and the literature regarding teachers' professionalism limited my interpretations to the context of my research questions. I acknowledge McKie's (2002) point that my findings are only valid within the boundaries of this research study.

The interpretivist paradigm enables researchers to demonstrate their interest and concern for their participants while recognising and understanding their experiences (Cohen, Manion and Morrison, 2018). I could relate to the teachers' experiences of enacting the NNS and PNS as I had experienced these two events. My current role as an initial teacher educator means that I am aware that teachers have different attitudes to mathematics, as argued by Witt (2014). I accept that the teachers' responses are valid in terms of their experiences and that there is no external reality of policy enactments of the three phases. Therefore there is no 'ultimate truth' to discover (Burr, 2003: 204). The interpretivist paradigm enabled me to elicit a range of responses from a range of teachers.

4.2.1 Epistemological and ontological considerations

Mason (2002) states that epistemology relates to how knowledge is known, i.e. the generation of knowledge from research. An interpretivist epistemology enables researchers to gain an 'understanding of human behaviour' (Bryman, 2016: 26). Combining the interpretivist epistemology with social constructionism theory meant that my knowledge and understanding was co-constructed through talking with the participants, as suggested by Burr (2003). As the teachers and I talked within the interviews I acted as an interviewer as a traveller (Kvale &

Brinkmann, 2009). I travelled with the participants as they reflected upon their responses and I constructed my understanding from their experiences. Thus, I socially constructed my knowledge of the teachers' experiences.

Coupled with the teachers' interpretations of their experiences was my interpretation of their responses (Gilbert, 2008), which leads me to my ontological stance. Ontology is the understanding of the social world, the reality of things and how they work (Mason, 2002). An ontological position is informed by an individual's perspectives of what makes up the social world, which according to Mason (2002) includes elements such as people, texts and rules. Bryman (2016) argues there are two contrasting ontological positions, objective where one believes that knowledge exists externally or constructive where knowledge is constructed in social interactions. My ontological stance is that knowledge is constructed and there are different perspectives of knowledge (Burr, 2015). I explored what Mason (2002: 14) refers to as teachers' 'experiences, accounts' and the 'actions' related to their policy enactments.

Both my epistemological and ontological stances drew on social constructionism. I gained an understanding of the teachers' experiences by talking with them and co-constructing their understanding (epistemology). I gained an understanding of their realities by co-constructing their perspectives of their experiences (ontology). Therefore I was able to present the teachers' responses, their professionalism and the range of policy enactments.

4.2.2 Methodology

I used a qualitative methodology within my research study and I now define this approach and discuss its uses and limitations. Qualitative methodology enables the researcher to understand peoples' experiences, within the participants' natural settings, recognising that there are many realities (Newby, 2014). The data are rich in description (Newby, 2014). Researchers are able to elicit in-depth understanding of their participants' experiences while giving 'voices to participants' (Cohen, Manion and Morrison, 2018: 288). Using a qualitative methodology compliments social constructionism with regard to the need to gather 'the experience and accounts' of the participants (Burr, 2015: 170).

Qualitative research is grounded in the interpretivist approach (Mason, 2002) which enables participants to interpret their experiences and construct their understanding of their world

(Bryman, 2016). The researcher then has the chance to explore the participants' experiences through conversation (Robson, 2011, Bryman, 2016).

It is useful for researchers to have the opportunity to pursue themes within the data collection which the semi-structured interview provides, according to Cohen, Manion and Morrison (2018). During this face to face interaction researchers immerse themselves into participants' social settings, enabling ideas to develop (Newby, 2014). Researchers also have the opportunity to modify their questions or responses as they engage in conversation with their participants or on reflection of an interview.

A limitation of the qualitative approach is that researchers gain a large amount of data and they need to be selective with the data chosen for analysis (Cohen, Manion and Morrison, 2018). I therefore chose not to include an analysis of facial expressions and body language, despite Miles and Huberman's (1994) claim that these could contribute to an interesting analysis. Instead, I chose to present and analyse teachers' verbatim responses 'in terms of the meanings people bring to them' (Denzin & Lincoln, 2011: 3). Nonetheless I had to make decisions regarding the responses that I selected for discussion from an extensive range of data. I discuss my processes for my data selection in section 4.3.

4.2.3 The semi-structured interview

I now discuss my reasons for selecting the semi-structured interview as my research tool. The interview is a conversation that has 'structure and a purpose' (Kvale & Brinkmann, 2009: 3). The semi-structured interview provides flexibility to the researcher in terms of when questions are asked and when a probing question might be appropriate (Cohen, Manion and Morrison, 2018). I planned for my interviews to explore certain topics, such as the launch of the PNS and the removal of the PNS and although I had prepared questions about these events I did not ask them in a systematic manner. In compiling my interview questions I reflected on my own policy experiences (as described in section 1.2). Burr (2015) argues that researchers' assumptions will be evident in the questions they ask. I acknowledge these assumptions drove my research as it is not possible for researchers to 'view the world from no position at all' (Burr, 2015: 172).

Power relationships exist between the interviewer and the participants, according to Creswell (2013). Goodson and Sikes (2001: 29) suggest that interviews that include a conversational

approach create a ‘positive and trusting relationship’ which could mitigate the issue of power. I told the teachers about my experience of receiving the PNS to show them that we had shared an experience and to facilitate a positive relationship. This action helped me establish what McKie (2002) refers to as a ‘power with’ relationship, with mutual power between the participant and myself. However I accept that I still defined and controlled the conversation through the questions I asked and my selection of which of the participants’ responses I chose to pursue.

The conversational approach I undertook within the interviews meant that teachers spoke about their experiences in a general sense. Thus, in the following data chapters I provide the interview question(s) that preceded the teachers’ responses. Certain topics such as autonomy were introduced by my question ‘to what extent do you feel you have exercised autonomy?’ I also state when teachers raised a topic, e.g. Hasnia spoke about autonomy while reflecting on the change she experienced when the NNS was introduced. My interview questions can be found in appendix 1 and extracts from two transcripts are in appendix 5.

My interview questions (see appendix 2) were designed to focus the teachers to consider their autonomy in terms of their professional judgements, PCK and their professional development. For example I asked teachers what guidance and/or support they received (alluding to their professional development). I asked them to reflect on the extent to which they followed this guidance (which relates to autonomy). Secondary questions were asked in accordance with a participant’s response and the researcher’s need to explore further, according to Cohen, Manion and Morrison (2018). I asked secondary questions to enable the participant to adjust or expand upon their response should they have misunderstood or initially provided a brief response, e.g. “did you create your school’s calculation policy or was it given to you?” I also sought clarification of a point for my own understanding, for example ‘who are you referring to when you say the office?’ (the teacher was referring to the head teacher and the SLT).

Acting as an interviewer as traveller led to me using my interview questions as an outline of topic coverage. These questions were sorted into topic areas; professional information, historic context, current context and teacher autonomy. I employed what Kvale and Brinkmann (2009: 130) refer to as ‘judgement and tact’ to decide which questions I asked, the order in which I asked them and which responses to pursue. I consider that I provided teachers with the opportunity to

reflect as we spoke about their experiences in a general sense as opposed to answering questions in a systematic manner. By asking different, open ended questions about a topic I led teachers to talk in depth without them feeling that a previous response had been insufficient.

Helsby (1995: 324) argues that when teachers have the opportunity to prepare for an interview their responses are 'prepared and considered' rather than 'spontaneous'. I recognised how I provide better responses when I prepare in advance and I wanted to provide this opportunity for the teachers. Therefore I gave out the interview questions to 27 teachers in advance and they decided whether or not to look at them. Two part time teachers missed my introduction but became involved on the day of my visit and therefore they received the questions on the day of their interview. All but four of the teachers looked at the questions. Fifteen teachers made notes that they brought into the interview and eight teachers used the questions to mentally prepare. The teachers who had prepared their responses told me that they found the process helpful, nonetheless, the teachers who had not looked at the questions did not report feeling unprepared.

4.2.4 Pilot Study

Within the pilot study I encouraged participants to talk to each other before their individual semi-structured interviews in order to 'formulate in a dialogue their own conceptions of their lived world' (Kvale, 1996: 11). There were mixed reviews from the teachers, one found the process helpful. One teacher found the process helpful to an extent. Her colleagues' experiences were remote from her own as she had worked in a different school when the NNS and the PNS were in situ. The head teacher chose not to discuss the questions with the other teachers in the sample. Unfortunately, one teacher found the process overwhelming as she had not contributed to the conversation when she had met with her peers and her colleague had given her a copy of the notes of the conversation. This resulted in the teacher feeling nervous at the outset of the interview as she was trying to explain someone else's notes rather than reflect upon her own experiences. After a short while, this teacher put down the notes and said that she did not need them as she knew what she was talking about. It was obviously not my intention to subject this participant to feeling overwhelmed. I removed the suggestion that colleagues discuss their experiences before their interviews in recognition of this weakness in my research design.

I planned for participants to complete a sketch to show their career path from the time the PNS had been launched (and possibly before this if the teacher had been teaching prior to 2006) to the current date. I anticipated that teachers would include the schools they had worked at, the year groups they had taught, their different experiences of teaching mathematics and phase related issues. Mason (2002) cites the sketch as an effective method to promote a natural dialogue without the need for interview questions. The idea of participants creating a sketch supported my decision to conduct the interviews in a conversational way and act as an interviewer as traveller. I wanted to put my participants at ease and based my decision on my viewpoint of how I would like an interview to be conducted. However, it cannot be assumed that the participants will share the researcher's views (Henn, Weinstein and Foard, 2009). I recognised that I wanted the teachers to agree to complete a sketch in order to validate my idea and I removed it from my research design after it was rejected by all of the participants within the pilot study.

I had not included deputy head teachers within my purposive sampling (which I discuss in section 4.2.6) and therefore I did not interview a deputy head teacher at the pilot school. However, I interviewed five deputy head teachers within the four schools that I subsequently visited. I now recognise this teaching position as important as deputy head teachers have a leadership role and may or may not be class teachers (three of the five within my sample were class teachers). I acknowledge that there is not a deputy head teacher from each school and accept that I have limited the potential to compare and contrast their responses.

4.2.5 Reliability and validity

Reliability relates to the accuracy of the data collection and analysis in order to answer the research questions, according to Mason (2002). The findings from one research study should be repeatable (Burr, 2015). Kvale and Brinkmann (2009) suggest that reliability can be negatively affected if participants give different responses to different researchers. I was the sole researcher therefore I suggest that my data are reliable in this regard. However, as discussed earlier (section 4.2.3) within the interviews I asked questions according to topic areas and in response to teachers' responses. Therefore I acknowledge that I asked questions in different ways within the interviews, thus there was the potential for teachers to give different responses. I suggest that by grouping the varying questions into the same topic areas within each interview area I mitigated

this concern. Asking the teachers if they had anything to add when we had reached the end of a topic area was a further mitigating action. If I had not asked a question to which they had prepared a response they had the opportunity to make their point.

I heeded Gray's (2009) advice of recognising and reducing my bias by including all of the teachers' responses that related to their policy enactments and professionalism. I recognise that the selection of responses was subject to my interpretations which resonates with Mauthner and Doucet's (2003: 416) warning that researchers bring along 'pre-conceived ideas and assumptions' to their research. Initially I sought the negative points from the teachers' responses as I thought their experiences would echo my own. The following reflection from my research diary shows a realisation of my bias:

> Interesting how now I am analysing data I am seeing responses in a different light. Whereas during the pilot study interviews I thought I was hearing mainly negative points I've realised that there are many more positives (Research diary entry 16 September 2015).

I had been looking for myself in the interviews (and subsequent transcripts) and according to Mauthner and Doucet (2003) I privileged the responses that resonated with my own experiences. Fortunately I made this realisation early on in my data analysis and therefore changed my positionality. As I continued with my analysis and discussion of findings my supervisors made me aware of where I reverted to a negative perspective. I became more focussed on how and why teachers responded and the effect of their policy enactments on their mathematics teaching.

In order for a research study to be valid, Mason (2002) suggests that researchers collect data which both addresses and provides explanations in order to address their research questions. The researchers' findings need to match 'what is really there' (Burr, 2015: 177). Gilbert (2008) claims that when asking participants to recollect an event from the past, they could give a different response each time they are asked. Thus the validity of my study could have been compromised by the expectation that the participants needed to recollect events from 2006 and earlier. In order to reduce the impact of this I asked the teachers to describe their experiences, which enabled them to simultaneously be part of the experience, i.e. they socially constructed their understanding of events (Burr, 2015). I accept this action was a compromise as the teachers will

have considered how they believe they responded in the past, borne from their understanding at the current time of their interview.

I offered the teachers within my sample the opportunity to check the transcript of their interview, which according to Cohen, Manion and Morrison (2018) is an effective approach towards ensuring the data are valid. Mason (2002) warns that participants may in retrospect wish to expand or reduce their initial viewpoint, which could negatively affect the validity of the data. This was not the case as none of the teachers asked me to amend his/her transcript. According to Burr (2015) auditing the analytical process validates the research. Maintaining a research diary (extract is in appendix 10) aided my recollection of my data collection and analysis. While I accept that my dairy contains my viewpoint I contend that it did facilitate my recollection of my processes and therefore provides some validation to my findings in light of my research questions.

4.2.6 Sample & access

I now turn my attention to the purposive and convenience sampling that I undertook within my research study to create a sample of 29 teachers from five primary schools in a London borough. Sampling involves selecting a small group of individuals as a representation of the general population and the sample is determined by the topic of the research questions, according to Mason (2002). As my research questions relate to teachers' responses it was pertinent that I included school-based teachers within my sample.

Purposive sampling requires a specific selection of participants, based upon their current role and length of time within the profession (Cohen, Manion and Morrison, 2018). It was important to my study that all of the participants had been teaching since at least 2006, the year that the PNS was launched. I planned to include a head teacher, a mathematics coordinator and at least two class teachers from each school in order to explore responses from teachers with a broad range of experiences and responsibilities. The greater number of class teachers was pertinent as they had experienced the contrast within the phases while maintaining the same teaching position and their experiences of mathematics teaching was both historic and contemporary. My resultant sample included five head teachers and mathematics coordinators, five deputy head teachers and 14 class teachers. Unfortunately, only one class teacher from Bellingham School is included as the

second teacher was absent from school on the day of the interviews and declined my requests to reschedule. The loss of this participant occurred at the final school in which I conducted my interviews. I had interviewed 14 class teachers at this time and therefore I accepted that I had a sufficient number of responses.

Convenience sampling led me to approach head teachers with whom I have developed a positive relationship as part of my current role of teacher educator. Cohen, Manion & Morrison (2018: 218) refer to convenience sampling as 'accidental or opportunity sampling' which is indicative of my method as I secured these schools' participation through an already established professional relationship. The inclusion of five deputy head teachers was accidental, indeed I was not aware of the significance of their management position until I completed my data collection. I recognise that deputy head teachers' perspectives reflect a level of responsibility yet this differs from head teachers who have overall responsibility for their school. All of the deputy head teachers were members of the SLT while some but not all of the mathematics coordinators and class teachers held SLT positions. Thus deputy head teachers brought a different range of experiences and perspectives to my findings.

Table 4.1 provides details of the participants that includes the name of the school and the teachers' pseudonyms. Head teachers' names start with H, mathematics coordinators' names start with M, deputy head teachers' names start with D and class teachers' names start with T.

Table 4.1: A vignette of each participant within my sample

Name	School	Started teaching	Year Groups taught	Different Schools	Class teacher?	Additional information		Became HT/DHT/MC
Holly	Kersley	1987	ALL	Y	N	Taught overseas	SLT	2014
Maisie	Kersley	1992	ALL	Y	Y	Maternity leave 2006	SLT	2008
Tabitha	Kersley	1995	ALL	Y	Y	Different school 2006	SLT	
Tanya	Kersley	1978	FS KS1 Y3	N	Y		SLT	
Harry	Armstrong	2000	ALL	Y	N	Different school 2006 Acting HT	All participants are	2014
Miranda	Armstrong	2001	2	Y	Y	Different school 2006	members of SLT	2006
Tahreem	Armstrong	2001	1, 2, 3	Y	Y	Taught overseas prior to 2001	School was in ISP	
Terry	Armstrong	1996	3, 4, 5, 6, 7	Y	Y	Different school 2006	2006	
Tina	Armstrong	2003	3, 5, 6 covered all	N	Y	Maternity leave 2006	School was in special	
Dom	Armstrong	2003	3, 4, 5, 6	Y	N	Deputising deputy head 2015	measures 2009	2015
Tracey	Armstrong	2000	4, 5, 6	Y	Y	Different school 2006		
Hannah	Pemberton	1995	ALL	y	N	Different school 2006	School was in ISP 2006	2008
Molly	Pemberton	1995	2, 3, 4, 5, 6	y	Y	Different school 2006		2007
Danica	Pemberton	1999	ALL	N	N	Deputy head	SLT	2006
Deanna	Pemberton	1994	KS2	Y	Y	Deputy head	SLT	2006
Tallula	Pemberton	2006	1, 2, 3, 4, 6	Y	Y	Different school 2006		
Tara	Pemberton	2004	4, 5, 6	Y	Y	Maternity leave 2011 - 2014		
Tessa	Pemberton	2005	KS2	Y	Y	Different school 2006		
Hasnia	Lethbridge	1995	ALL	Y	N	Different school 2006	School was in ISP 2006	2007
Meena	Lethbridge	2000	2, 3, 4, 5, 6	Y	Y	Different school 2006	Taught overseas	2008
Dabria	Lethbridge	2003	N, R, KS1	Y	Y	Deputy head	SLT	2010
Taluja	Lethbridge	2004	N, R, 1, 4, 5	Y	Y	Different school 2006	SLT	
Tasha	Lethbridge	2004	3, 4, 5, 6	N	Y			
Tianna	Lethbridge	2005	2, 3, 4, 5, 6	N	Y	Assistant head teaches maths groups	SLT	
Tony	Lethbridge	1999	ALL	Y	Y	Different school 2006		
Tricia	Lethbridge	2005	KS2	N	Y	Maternity and supply 2006		
Heather	Bellingham	1976	N, R, 2, 3	Y	N	Different school 2006		2010
Michelle	Bellingham	2000	ALL	y	Y	Seconded as assistant head to another school for one year 2013-14	SLT	2009
Daisy	Bellingham	1992	ALL	Y	Y		SLT	2008

I have included the year the teachers started teaching to know the length of time they had taught as at each phase. I also included the year that mathematics coordinators, deputy head teachers and head teachers started in their role to guide my understanding of how their position of responsibility affected their responses. The table lists the year groups that each teacher taught to provide the scope of their teaching experience. I have also included whether or not teachers taught in different schools and/or had been class teachers at the time of their interview. The table shows additional information that may have affected teachers' responses, for example Holly taught overseas at one time in her career. This contextual data aided the co-construction of knowledge within the interviews. For example I asked Tabitha to compare the school calculation policy between her previous and current school to understand how the differing approaches affected her mathematics teaching. Occasionally this data affected my interpretations, e.g. I understood that Tahreem found differentiation in the NNS difficult as she had not differentiated in her teaching prior to working in an English school.

Knowing when the teachers started teaching enabled me to elicit which policy (if any) was in situ during their NQT year. I was able to build a picture of teachers' 'policy biographies' (Ball, Maguire and Braun, 2012: 43), for example if they had taught prior to the introduction of the NNS and the length of time teachers had enacted the NNS (or the PNS in Tallula's case). I approximated Tahreem's length of teaching prior to the introduction of the NNS as I failed to ask her how long she had taught in South Africa before moving to England. I adjusted her length of time teaching in phases two and three and placed an asterisk (*) beside her name to indicate the approximation.

I collected data from the government's school data website to provide detail in terms of the size of the schools and their pupil cohort as at 2015 when I conducted the interviews. I summarise the characteristics of each school in table 4.2, e.g. Kersley Primary had just had the addition of a new building. These data are interesting in terms of knowing the size and demography of the schools however I did not draw on this contextual information within my analysis. Hence, I include an extract of the school data within this chapter and the table appears in full in appendix 3.

Table 4.2: An extract from the summary of schools table

Name of School (pseudonym)	Number of children on roll. Year groups included in school. Percentage of children: who have a special educational need (SEN) who have English as an additional language (EAL) who receive free school meals (FSM)	Characteristics of School
Kersley Primary	526 on role Nursery to Y6 7% SEN 24.8% EAL 17.3% FSM Source: http://www.education.gov.uk/schools/performance/ last accessed 30 March 2015	Just completed new build. Two form entry, with YR, Y1 and Y2 being three form entry. Ofsted rating good 2014.

4.3 Data analysis

I undertook a thematic analysis, drawing upon the models of Braun and Clarke (2006) and Bryman (2016). I used elements of the two different models, which I now explain and justify. My approach led to the themes emerging from my data, which required from me a rigorous approach to my data analysis. I wanted to develop cumulative themes within the three phases to explore how teachers' previous policy enactments influenced their contemporary responses (Kelchtermans, 2005, Ball, Maguire and Braun, 2012).

I began my data analysis immediately after conducting each of the interviews. I started by creating the transcripts, which I uploaded to NVivo 11 (a qualitative data software package). As a result of my conversational approach within the semi-structured interviews the teachers' responses were spread throughout the transcript as opposed to being connected to one interview question. I followed Newby's (2014) recommendation of reading the transcripts repeatedly in a different order from their accumulation and from different points within the transcript. This process enabled me to gain a good sense of the data and the themes emerged from different parts of the teachers' overall responses. For example, a new reflection of a point discussed at the outset was made towards the end of the interview or a teacher substantiated an earlier point within their later recollections.

I then began a systematic process of identifying responses that showed teachers' reflections of the policy and their teaching of mathematics within each policy phase. I copied these responses from NVivo 11 into a table within Microsoft Word (see appendix 4). I labelled the columns with the teaching positions of head teacher, mathematics coordinator and teacher and pasted the teachers' responses into the rows of the table. Deputy head teachers were included in the class teacher column. Initially each response went into a new row, as each topic of the teachers' responses was new and different and I recognised the variety of responses amongst teachers' responses, as recommended by Bryman (2016). However as I continued selecting responses to paste into the table I was able to be more succinct and I collated responses of the same topic within a row. Bryman (2016: 586) refers to this collation process as the identification of 'topics that recur again and again'. I recognised these topics as emergent themes and considered how to name them.

I drew upon Braun and Clarke's (2006) recommendation of comparing the responses, continuing to recognise recurring topics and identifying the common topic, which became the theme. After a new theme had been created I went back to the transcripts in NVivo 11 to examine whether other teachers had made similar responses. Bryman (2016) states that refining and modifying themes is a necessary action when analysing qualitative data. Initially I was too literal in naming the themes, e.g. in phase one I named a theme adaptations of the NNS. This was limiting as I did not have the capacity to recognise similarities and nuances within the responses, I only focussed on the different ways in which teachers adapted the policy. As I progressed with my analysis I identified that teachers were adapting the NNS in accordance with their PCK and their professional judgement. I then utilised Bryman's (2016) approach of drawing on the literature to name the theme.

I applied the theoretical lens of policy enactment and the literature regarding professionalism and saw that there were rich findings beneath the initial topic of each response. I identified where teachers referred to their professionalism, e.g. Taluja said that she and her colleagues were 'like sheep' in their responses to the NNS. Her reference to sheep suggests that she was expected to follow the school's approach, therefore her professional judgement was not needed. Taluja's autonomy was reduced and I discuss this response further in section 5.4.

What I did not have at this stage was sub-themes, which I created as I started to analyse the teachers' responses within each theme. Braun and Clarke (2006) and Bryman (2016) suggest that sub-themes are created first and then drawn together into themes. My analytical process was less linear. Although I recognised the themes I did not identify the nuances that went on to become sub-themes until I immersed myself in the presentation and discussion elements of my data chapters.

I needed to select which themes I would analyse and which would be omitted. I selected the themes that reflected teachers' responses (thoughts and actions) to policy and their mathematics teaching. These themes contained the largest number of responses. In phase one I included the theme of prescriptive practice (that only included three responses) as the topic recurs in phase three and I recognised an interesting contrast between the two. Pressure in phase two only contains six responses and I included it because the different types of pressure appeared to have

led to different responses. Thus the criteria were hierarchical starting with the relevance to the research questions, then similar topics and finally the number of responses.

The theme of PCK, policy and professional judgement occurs within each phase. Teachers referred to their PCK throughout their interviews and I designed my interview questions to explore their autonomy, therefore it makes sense that the theme is repeated. Professional development occurs in phases one and two reflecting how the NS included opportunities for teachers to enhance their practice, which ceased when the NS ended.

I selected the theme of prescriptive practice in phase three, which contained ten responses. I then reviewed my data as I recalled that teachers referred to the NNS in terms of being prescriptive. Despite there being only three teachers' responses for prescriptive practice in phase one I included the theme as a precursor to the differences shown in phase three.

In terms of presenting my findings I created a frame where teachers' responses were characterised by whether the policy was useful, not useful or useful to some extent. This frame helped me present the teachers' responses within each theme in sections according to their perceptions of the usefulness of the policy. Policy was useful when teachers' practice was enhanced and they benefitted from its guidance. In contrast, policy was not useful when teachers perceived that their PCK was more relevant or they had limited choice in terms of their enactments. An example of policy being useful to some extent can be seen in Terry's response to phase two when he used the PNS and adapted it when he prepared his pupils for their national tests (section 6.3.2).

4.4 Ethical considerations

Ethics are agreed on principles that maintain relationships with participants and the quality of research projects. Researchers need to keep data safe and avoid causing harm within or as a result of their research study (Brooks, te Riele & Maguire, 2014). At the research design stage researchers need to clarify the sensitivity of their research in order to gain access to their participants (Brooks, te Riele & Maguire, 2014). Within this section I am going to discuss my ethical considerations that were approved by the University of Roehampton Ethics committee in 2014 (see appendix 6).

Each of the head teachers from my sample of five schools agreed to be a gatekeeper (consent form is in appendix 7). They gave their consent for me to conduct my research in their school and interview the teachers on their staff. I notified each head teacher that the name of the school would not be included within my thesis in order to pre-empt concerns regarding damage to their school's reputation or their wishes to promote their school (Henn, Weinstein and Foard, 2009). Schools have only been mentioned in a broad geographic sense as being within a borough of London and I have given each school name a pseudonym to protect their identity.

I gained informed consent from the participants after I introduced my research at a staff meeting and gave them the option to decide if they wanted to participate, which Robson (2011) claims contributes to conducting ethical research. Brooks, te Riele and Maguire (2014) argue that when researchers present their research study to a group some might find it difficult to decline to participate. The presence of the head teacher within my introductory meetings may have further restricted teachers' perceptions of whether or not they should be involved. When I arrived at one school for the interviews I learned from the head teacher that two teachers who had missed my introduction wanted to be involved. I appreciate that they may have offered their participation having heard about my visit from colleagues or they may have felt compelled to agree as they were approached by the head teacher. When I met with the two teachers I explained my research and sought their informed consent. They both agreed although it might have been uncomfortable for them to decline once they were in a meeting with me. Nevertheless the interviews went well and there did not appear to be any resentment.

Within the interviews I reminded the teachers of their informed consent and that they could withdraw from the study at any time, as recommended by BERA (2011). Thus, there was an opportunity for teachers to remove themselves from the research in a less public manner or in response to events that occurred after the interview. None of the teachers withdrew.

I was clear within the participant informed consent documentation (appendix 8) that I would anonymise participants' responses in order to protect their identity and preserve their confidentiality, as recommended by BERA (2011). Initially I claimed within the participants' consent form that anonymity amongst participants would be offered from the outset. I came to see this offering as over-cautious as almost all of the eligible staff witnessed each other's

agreement to participate. Anonymity therefore related to participants' responses within my thesis as opposed to their anonymity within their school setting. This minor amendment received approval from the University's Ethics Committee in May 2015 (appendix 9).

Lindsay (2010) confirms that anonymity cannot be guaranteed as teachers may recognise their own response or a peer's viewpoint when they read the researcher's thesis. To address this I informed participants that I would omit or disguise any identifying details of themselves or their school, as recommended by Hill (2005). Three schools were involved in the ISP, thus increasing the opportunity for teachers to identify themselves. I recognise this as problematic however there was some mitigation of revealing the school's identity as it was one of three.

Creswell (2013) states that steps should be taken to avoid participants feeling used as researchers seek personal advancement as a result of their engagement with participants' lives. I was keen for teachers to reflect upon their policy enactments and for them to think about how and why they might respond to future policy initiatives, which is good ethical practice, according to Flick (2014). Several teachers mentioned how insightful it had been to have a focussed conversation about their mathematics teaching and to have reflected upon their policy enactments.

Participants' email addresses were accessed from my University email account which is password protected. Data were stored on a personal laptop, which is password protected and backed up on a USB memory stick and on a PC in my workplace, which are also password protected. Data relating to participants' identities have not featured in the format of a transcript or within their participant consent form, as recommended by Lindsay (2010). While General Data Protection Regulations do not state how long research data should be kept, the University's guidelines are for data to be deleted ten years after the publication of my PhD thesis (University of Roehampton, 2018). In accordance with the ethics guidelines (University of Roehampton, 2011) the data shall be safely stored on a password protected USB until it is deleted.

4.5 Reflexivity

Within my research diary I reflected on how and when I voiced my 'assumptions and views' within the interviews and within my early data analysis (Mauthner & Doucet, 2003: 419). The research

diary was helpful in focussing my attention to how my questions may have led teachers to give the response I wanted to hear. An extract from the research diary dated 12 March 2015 stated:

> The deputy head had very similar opinions to mine and I found myself encouraging him to say more of what I wanted to hear. A few times I said, "No I mustn't put words into your mouth" or " I could talk to you lots more, but we should move on."

This extract comes from the interview that I had with Dom from the second school that I visited. As I created the transcript I recognised that I accentuated the negative in order to seek responses that resonated with my own, counter to Mauthner and Dowcet's (2003) warning that researchers must avoid privileging some data over others. In response I drew upon Lincoln and Guba's (1985) suggestion that researchers should recognise their bias and I did not repeat these phrases again. I also made a conscious effort to reduce putting across my perspective to the teachers.

I designed my research study in 2012, before the NC became statutory policy in September 2014. Therefore I had not included an interview question asking teachers about their responses to this new policy. During the meeting where I introduced myself and within each of the interviews at my pilot school the teachers spoke about the NC. I reflected upon the significance of these teachers' responses and recognised that the NC had had a significant effect on their experiences. I considered how I could explore this topic and decided to alter my interview questions, as recommended by Gray (2009). I did not add a question to the sheet that was handed out to teachers, instead I decided that I would ask about the NC as a secondary question if teachers did not raise the topic themselves. I made this decision because my research questions referred to three phases of the PNS and I wanted teachers to focus (in their preparation for the interview) on how they were affected by the removal of the PNS (phase three). Thus I recognised the significance of the NC while taking action to ensure that it was not the only policy that featured in the final phase.

I also reflected on my data analysis (extract is in appendix 11) and recorded the difficulties I encountered and the many alternate analytical methods I attempted before I settled on the thematic analysis that has appeared within this thesis. In hindsight I recognise that I had used a thematic analysis approach throughout the 18 months that I spent analysing my data but it was

the naming of themes and sub-themes with which I had struggled. Below is an extract from my reflections of data analysis that demonstrates how the topics remained while the names of my themes changed. The extract is dated 8 February 2016 and the topic is mathematics schemes (which emerged into a theme in phase three):

> Mathematics schemes – initially I wanted to have an interview question related to individual's use of published schemes. I left it out as I didn't want to be leading participants into thinking that a mathematics scheme was part of the PNS. I am intrigued as to teachers' perceptions of a mathematics scheme, my experience is that they are adopted a little too literally and that teachers don't adapt or tweak them. People would purchase a mathematics scheme so does this mean that they are more likely to want the scheme to be successful? Why might they struggle with the prescriptiveness and lack of autonomy within the PNS but accept this within a scheme?

This extract reveals the uncertainty I experienced regarding how a theme should emerge. I applied my experience and views that have not been substantiated by any data and I am judgemental of teachers. I now recognise that mathematics schemes emerged within phase three and in section 7.4 I have shown how it was the teachers' responses to the NC that brought about their reflections.

4.6 Summary

I undertook my research study within the interpretative paradigm, which enabled me to make meaning of a wide range of teachers' experiences. My epistemological approach enabled the teachers and myself to co-construct our understanding of their experiences. I drew on Burr's (2015) theory of social constructionism and asked teachers to describe their responses to each policy phase within the interview. As the teachers talked with me they constructed and interpreted their understanding of their experiences. Travelling with the teachers enabled me to simultaneously construct my understanding. I interpreted their responses by recognising that there are a range of outcomes when exploring peoples' experiences (Mason, 2002, Burr, 2015). Hence my ontological stance was social constructionist and I gained an understanding of the teachers' perspectives of their responses to policy.

The qualitative methodological approach enabled me to focus on the teachers' experiences. I elicited data that presented the teachers' experiences and are rich in description. By focussing on topic areas within the semi-structured interviews I avoided a systematic process of asking questions and I was able to pursue points raised by the teachers that I considered pertinent. This process could bring into question the reliability of my research study. However as recommended by Kvale and Brinkmann (2009) acting as an interviewer as traveller who travelled with the participants enabled the teachers and me to construct knowledge together. The conversational approach that I adopted within my interviews also meant that I mitigated the issue of control within a potential power relationship during the interviews. A limitation of the qualitative methodology is that I gained a large amount of data and had to make decisions regarding the data I selected for analysis. Limiting my focus to teachers' verbal responses was helpful and as discussed deciding which responses to select for analysis was a complex process.

I took steps to ensure my data are reliable. I asked different questions to travel with the teachers but I did follow the topic areas of my interview question sheet of which the teachers had a copy. I took steps to address my bias. I believe my data are valid within the boundaries of my research as teachers had the opportunity to describe and reflect on their experiences. I was personally invested in my research and I did want to 'find' what I thought 'should be in [my] data' (Brooks, te Riele & Maguire, 2014: 130). Initially I designed my interview questions to explore power relationships and my theoretical framework drew on Foucault's (1982) ideas of power. While my research questions remained the same my theoretical framework changed to include policy enactment and social constructionism theories. My interview questions remained relevant and I suggest this was because despite my focus on power I had actually sought to explore how teachers had responded to each phase.

I undertook a thematic analysis that included reading and re-reading the transcripts and creating a table of the teachers' responses. I compared the topics mentioned by the teachers in order to collate the responses into emergent themes. Re-examining the transcripts when I identified a new theme meant that my analysis was rigorous. I also consider my analysis to have been robust as I compared the teachers' responses, refined and modified my themes and then re-examined the selected themes in order to recognise sub-themes. My theoretical framework guided how I

explored teachers' policy enactment and I drew on Ball, Maguire and Braun (2012). I focussed on how teachers interpreted, translated, reconstructed and remade policy.

The table of themes and the teachers' responses have been modified many times as I sought to collate the teachers' responses into themes. By focussing on the topic of teachers' responses I enabled the themes to emerge from the data that I linked to the literature. By using the teachers' verbatim responses I addressed the first two research questions regarding teachers' responses and their perceptions of their experiences. I addressed my third question regarding similarities and differences within the responses by maintaining the themes' names across the phases.

My ethical considerations supported and maintained 'research integrity' (Brooks, te Riele & Maguire, 2014: 42). I gained informed consent from each of the teachers as well as head teachers who granted me access to their schools and teachers. I accept that while I considered ethics at the research stage of my design I had not pre-empted issues such as introducing my study to a group of teachers that included the head teacher or teachers being volunteered by the head teacher. My response to these issues was ethical as I offered individual teachers the opportunity to withdraw (Brooks, te Riele & Maguire, 2014). I have taken steps to protect the data and complied with GDPR guidelines. Having explained and justified my methodological considerations the focus of the next three chapters is the teachers' responses.

Chapter Five – Professional development, PCK and acceptance in phase one

5.1 Introduction

Within this chapter I present teachers' responses to the NNS that was introduced in 1999. As discussed in section 2.7 the NNS was a non-statutory, nationally launched policy. The policy included the numeracy hour and contained detailed worked mathematical models and yearly learning objectives that supplemented the NC. The NNS was designed to develop teachers' confidence and competence in teaching mathematics in order to raise standards (DfEE, 1999).

The findings within this chapter address my research questions, which are:

1. What are primary teachers' reflections on their responses to three phases of the PNS?

2. What are their perceptions of the effect these responses had upon their experiences of teaching mathematics?

3. How are responses similar or different between each phase and within the phases?

The teachers reflected on experiences that took place between 1999 and 2006. Their responses to the NNS show an acceptance of the policy alongside teachers' evaluations of their practice. I argue that professional development and PCK feature to a great extent in this phase as teachers recognised that the NNS contained detail from which they could make changes to the content and delivery of their mathematics teaching. In addition I suggest that the NNS was perceived as prescriptive due to the amount of detail that teachers saw as a statement of how mathematics should be taught, thus it had the potential to change their practice.

The aim of this chapter is to present and discuss the teachers' responses, which I present verbatim in order to contribute to 'keep the flavour of the original data' (Cohen, Manion and Morrison, 2018: 647). I discuss the responses in terms of teachers' construction of their professionalism, e.g. Hannah referred to how the NNS Framework folder (the Framework) was useful for differentiation. She evaluated the Framework in terms of her PCK and autonomy, which are characteristics of professionalism. My second area of focus is how teachers enacted the policy, i.e. what they thought about the policy and the actions they took.

As discussed in chapter four (section 4.3) I applied the following criteria to the creation of my themes. I selected responses that addressed my research questions, i.e. teachers' reflections on each policy phase and their perceptions of their experiences of teaching mathematics. I collated responses of similar topics into themes and I drew on the themes in the literature that resonated with policy enactment and professionalism. Themes with the greatest number of responses were selected for analysis with two exceptions.

In phase one the three themes are:

- The NNS was a means of professional development
- PCK, policy and professional judgement
- Prescriptive practice

I contend that phase one was a time where policy was perceived as a means of professional development and PCK. Teachers' responses indicate that the usefulness of the NNS varied in accordance with their evaluations of the policy and their capacity to develop their practice. In addition, albeit to a lesser extent the NNS was referred to as conducive to prescriptive practice. There are three key findings. Policy can be a means of professional development so long as teachers can recognise and understand its content and make changes that enhance their practice. There is a relationship between PCK and teachers' professional judgements that leads to connections or disconnections between policy and their practice. Teachers' autonomy affects or is affected by their interpretations of what they have to do and how they might change their practice.

There are 35 responses from 24 teachers and some teachers feature two or three times within the three themes. Miranda, Tabitha, Tina and Tony are not included in this first phase, possibly because the focus of the interview was the PNS and I did not prompt them to talk about the NNS. Tallula started teaching in 2006 and therefore she did not reflect on phase one. Table 5.1 shows the number of teachers who found the NNS useful, not useful or useful to some extent (total number in brackets). I collated the teachers' names by the length of time they had taught as at 1999 to show the connection between teachers' length of experience and their perceptions of policy (I develop this point within chapter eight). The table shows that many of the teachers within my sample were NQTs or ECTs in 1999.

Table 5.1: The length of time teachers had taught and their perceptions of the usefulness of the NNS (phase one)

Length of time teaching/policy was useful, not useful or useful to some extent	Policy was useful	Policy was not useful	Policy was useful to some extent
0-5 years	Danica Dom Hannah x 2 Harry Hasnia Meena Michelle Molly Taluja x 2 Tasha Terry Tessa x 2 Tracey Tricia	Dabria Deanna Hasnia Molly Tahreem* Taluja Tara	Deanna Tara Tianna
6-10 years	Daisy	Maisie x 2	
11-15 years	Holly		
16-20 years			
21-25 years	Heather	Heather Tanya x 2	

The first theme relates to policy as a means of professional development. It shows how teachers' experience and their capacity to develop their practice affected their perceptions of the NNS' professional development.

5.2 The NNS was a means of professional development

This theme emerged as teachers considered how the NNS enhanced their practice in terms of their PCK. In chapter two I showed that the NNS aimed to develop 'teachers' knowledge of the primary mathematics curriculum and appropriate teaching methods' (DfEE, 1999: 5). In what follows I argue that the teachers' responses were rooted in their evaluations of the NNS and their considerations of how the policy was beneficial to their practice and the extent to which their practice (including their PCK) was enhanced. The following responses show that teachers considered that the Framework, glossary booklet and the training contained new and useful mathematical guidance, which Hargreaves and Goodson (1996) refer to as relevant professional development. Autonomy is evident as teachers made professional judgements regarding how

they gained professional development from the NNS. Teachers were free to act on their judgements and they changed their practice or in the case of Maisie and Tahreem their capacity to develop was limited as they referred to a passive engagement with the policy.

Table 5.2 summarises the responses for the theme. I provide the name of the teachers' schools and the length of time they had been teaching when the NNS was introduced. The contents of the table are presented in alphabetical order firstly in accordance with the type of response given, then by the perceptions of the usefulness of the policy and finally by the teachers' names.

The teachers' names align to their teaching positions as follows:

- Head teachers' names start with H
- Deputy head teachers' names start with D
- Mathematics coordinators' names start with M
- Class teachers' names start with T

Table 5.2: Teachers' responses to the theme the NNS was a means of professional development

Name	Teachers' perceptions of the usefulness of the NNS
Maisie	Not useful
Tahreem*	Not useful
Daisy	Useful
Danica	Useful
Dom	Useful
Harry	Useful
Heather	Useful
Holly	Useful
Terry	Useful
Tessa	Useful
Tracey	Useful

Nine responses show teachers' perceptions that the NNS was useful and that the NNS was not useful for two teachers' professional development. I explain the meanings of these terms and the implications for teachers' practice as I introduce the responses. For example, Daisy perceived that her planning and teaching were enhanced as she gained detail regarding pupils' progression from the NNS Framework.

With regard to my key findings the following responses show that the NNS was a means of professional development as it contained concepts and worked examples of calculations. Teachers benefitted from the detail in terms of how mathematical concepts can be broken down into teachable parts. However Tahreem and Maisie spoke of their need for additional detail and specific training respectively. The differences in teachers' perceptions demonstrate that there is no objective knowledge regarding professional development. Teachers' PCK affects their recognition and understanding of new and potentially better mathematics teaching. I have not explored this point in terms of the social construction of professional development and I discuss this potential limitation in section 8.6.

The following teachers' responses arose when they reflected on the NNS as they answered my question regarding the launch of the PNS. I start by focussing on the responses that show the NNS was useful as these were the greatest in number. Daisy, Danica, Heather, Holly and Tessa considered the enhancement of their colleagues' practice in terms of gaining a greater understanding of pupil progress and being able to draw on the NNS for their planning. Daisy told me:

> And I mean pre-PNS I think I liked the old strategies, that was the blue folder, the NNS I loved that and I still, even now direct people back to it because you can see where the children have come from and where you're going to.

The idea that Daisy kept the NNS and still referred her colleagues to it 16 years after its introduction indicates that the policy was a very effective means of professional development.

Danica said:

> I think the whole sort of glossary that came with it, where it set out for each year group what a bar chart looked like, and what I do think that sometimes

> when people question you, you just give that back to them. I think that there was an element of support for the class-based teacher.

Danica also gave the NNS to her colleagues as a means of professional development. She suggested that the glossary and examples of a bar chart could enhance their use of mathematical language.

Heather told me:

> The numeracy strategy, the blue folder I thought that supported people who didn't have a full maths knowledge. But only that one really.

Heather considered 'people' (i.e. colleagues) who needed support in developing their PCK. She clearly wanted to assert that only the NNS had been beneficial in terms of enhancing teachers' practice. I suggest that her reference to 'a full maths knowledge' alludes to a need to develop their mathematics specific knowledge (e.g. concepts and structures). The detail contained within the worked examples in the NNS enabled teachers to review and update their PCK, according to Heather.

Holly taught for 12 years prior to the introduction of the NNS. She referred to the NNS' worked examples within the following response:

> With the sort of examples that they gave you we could then pick out from them and use them directly within the classroom. I think it helped teachers who were not necessarily confident mathematicians to develop their own skills when they were teaching the children these skills. So looking at how maths is actually broken down and reasons why you do certain things with numbers that maybe we weren't taught.

Tessa brought up the topic of planning and said:

> It gave me the guidance to do that and then I could use the different material, or different questioning from my own knowledge, my own experience. Like I said someone who is young and new, they need something to go by, I think that just helps them.

Tessa enacted the NNS as a NQT and perceived that she combined the Framework's guidance with her 'own knowledge' which shows that the policy provided relevant professional development in terms of her PCK.

Daisy, Danica, Heather, Holly and Tessa suggested that the NNS provided professional development for others. In contrast, the NNS was a means of professional development as part of the ITE for Tracey, Harry and Dom.

Tracey spoke of planning when she told me:

> I remember they brought out the CD-ROM unit plans and I know that you had to adapt them, but it was brilliant because it actually had the great ideas and it told you what it was expecting you to come out with, the outcomes and stuff.

Harry reflected on how the NNS enhanced his practice from the start of his career when he said:

> I had been trained and had used for a good few years the National Numeracy Strategy. Which for me at that time was very clear guidance and examples … I think it (policy) is important and it should support teachers' subject knowledge which I felt personally, the National Numeracy Strategy, although it was a long time ago, did.

Dom's response was:

> With subject knowledge I think I kept referring back to the National Numeracy Strategy. I felt that that was the document that supported me more.

These responses suggest that the NNS was an effective means of professional development as it contained resources and practical ideas. The teachers were able to develop their practice or suggested others could have developed by reading the Framework and understanding the mathematics within. Teachers selected a part of the NNS that they considered new and useful (e.g. planning). They acted upon their professional judgements by updating their practice and were therefore autonomous.

Tahreem taught in South Africa before she moved to England. Her response shows that there was quite a difference in the way mathematics was taught. She said:

> It was a lot of paper saying nothing, if that makes sense. Because they had all these things and I thought, 'yes but what do I have to do?' It spoke about differentiation but it wasn't given and so for someone like me who came from a system where there was no differentiation it was a learning curve for me. So how did I find it? I didn't enjoy it as I took it and then I had to go and find out more.

Tahreem needed more detail as she had not differentiated before. She interpreted the policy as potentially something that could have benefitted her teaching yet she was limited regarding how she translated the policy into her practice (Ball, Maguire and Braun, 2012). Her response supports Storey's (2009) concern that teachers do not benefit from professional development that addresses policy requirements. Tahreem needed practical training that could be used in her planning, possibly the 'deep analysis' model as recommended by NCETM (2009: 4).

The following two responses refer to the training that accompanied the launch of the NNS. The contrasting responses show that teachers evaluated the training in terms of how it met their professional development needs.

Terry's reflection was:

> I do remember the maths adviser at the time came in. The maths adviser was the person who presented five days training so yes it was incredibly thorough.

NCETM (2009) cite that effective professional development involves a knowledgeable tutor delivering training sessions. Terry's response supports this and he also suggested the duration of the training was beneficial.

Maisie reflected on the NNS training in the following response:

> Some of the training was just churned out and you got the feeling it was just one of many, they were just churning out and not adapting for you know, I've

> got this cohort of teachers, they are this sort of ability and experience and they were just teaching to the masses without being specific.

The training occurred when Maisie was a class teacher. She found the experience frustrating, which appeared heightened in her reflection as a mathematics coordinator. She perceived that she was a passive recipient of training that had not met her needs.

Terry considered that the training was thorough possibly because he had no specific professional development needs. He had three years' teaching experience prior to the introduction of the NNS and was receptive to the opportunity of evaluating and updating his practice. Maisie's need for specific training suggests that as she taught for seven years before the NNS was introduced her PCK was secure. Therefore the training had not addressed how she and others might adapt the policy based on their 'ability and experience'. These contrasting responses suggest that teachers' professional development was determined by their expectations (NCETM, 2009, Storey, 2009).

In sum, nine teachers considered the NNS as a means of professional development. Hence, the policy was a means of meeting teachers' 'immediate needs' (Storey, 2009: 132). These teachers evaluated the Framework, glossary booklet and training and selected parts of the policy that enhanced the following PCK topics; planning, progression, glossary and worked examples of calculations. They also suggested that other teachers could have gained professional development from the policy. Teachers needed to be able to understand the NNS' content, recognise new ideas and have the 'capacity and will' to make changes to their practice (Spillane, 1999: 144). Autonomous teachers made professional judgements regarding the potential enhancements to their practice. Their freedom to act was underpinned by their evaluations of the NNS and the selection of the relevant parts that could enhance their practice.

Not all teachers gained professional development due to their perceptions that the detail in the Framework and the training event was generic. Maisie and Tahreem were autonomous to the extent that they made professional judgements. They were unable to act as the training and the Framework had not provided sufficient detail to enhance their practice, thus their autonomy was limited.

In terms of policy enactment teachers drew on their PCK as they interpteted the mathematical concepts, models and teaching strategies within the NNS. They recognised how the NNS provided new ideas and therefore had the potential to enhance their practice. All but two teachers selected the parts of policy they considered appropriate, which Ball, Maguire and Braun (2012) state is the reconstruction of policy. They reviewed and updated their practice (or they considered the practice of others) in accordance with where enhancements could be made. The two teachers who were unable to gain professional development from the Framework (Tahreem) or the training (Maisie) appeared to ignore the policy.

5.3 PCK, policy and professional judgement

The second key finding is the relationship between PCK and teachers' professional judgements. PCK is knowledge of mathematics '*for teaching'* according to Shulman (1986: 9, italics as in original). Teachers draw on their PCK to decide, for example which methods and models they teach (part of mathematics specific knowledge), according to their pupils' previous learning (part of learning and attainment needs), which I explained in depth in chapter two (section 2.7.1). ITE courses are designed to develop teachers' PCK (DfE, 2012). However, the completion of an ITE course is not the end of teachers' development and they continue to develop throughout their careers (Askew et al, 1997).

Within this theme I argue that teachers made professional judgements when they evaluated how secure their PCK was or they considered that their PCK was more relevant than the NNS. I use the term relevant in accordance with Shulman's (1986) reference to the knowledge teachers need to address their pupils' learning and attainment needs. Their judgements affected how they perceived the policy should have been enacted. Teachers made connections when they updated and/or replaced their PCK, i.e. they gained security from the PCK within the NNS. Disconnections occurred when teachers suggested that they had to enact the NNS despite being secure in their PCK. I expand upon this terminology as I present and discuss the teachers' responses.

Teachers reflected on their use of the NNS and also responded to the question "how specific do you believe the policy was regarding mathematics subject knowledge and how and when mathematics should be taught?" I suggest that teachers were autonomous with regard to making

professional judgements of their PCK and they were free to act accordingly. However, their autonomy was at times limited due to the teachers' perceptions of how they should respond to policy.

Table 5.3 summarises the 21 responses for this theme in terms of whether teachers found the NNS useful, useful to some extent or not useful. Hannah, Hasnia, Taluja and Tara appear twice in recognition of their different responses.

Table 5.3: Teachers' responses for the theme PCK, policy and professional judgement

Name	Teachers' perceptions of the usefulness of the NNS
Deanna	Useful to some extent
Tara	Useful to some extent
Tianna	Useful to some extent
Dabria	Not useful
Deanna	Not useful
Hasnia	Not useful
Maisie	Not useful
Tanya	Not useful
Tanya	Not useful
Tara	Not useful
Hannah	Useful
Hannah	Useful
Hasnia	Useful
Meena	Useful
Michelle	Useful
Molly	Useful
Taluja	Useful
Taluja	Useful

Tasha	Useful
Tessa	Useful
Tricia	Useful

There are 11 responses where teachers spoke of the Framework and the numeracy hour and said that the NNS was useful. Seven teachers did not find the policy useful and three found it useful to an extent.

Table 5.4 summarises the PCK topics that teachers referred to in their responses. The table is separated into two columns showing where teachers gained security through their enactments of the policy and where they made professional judgements as they considered their PCK was more relevant than the policy. There is also a combination of teachers who gained security and drew on their professional judgements of their PCK.

Table 5.4: The effect of the NNS on teachers' PCK

PCK topics in which teachers gained security (connections)	Topics in which teachers considered their PCK was more relevant than the NNS (disconnections)
Differentiation Numeracy hour Progression Talk/activities Vocabulary Worked examples of calculations	Numeracy hour Planning Worked examples of calculations
Teachers gained security **and** drew on their professional judgements of their PCK (connections and disconnections) Planning Progression	

I now turn my attention to the responses that demonstrate how the NNS was useful as teachers gained security in terms of their PCK and they made connections to the policy. Hasnia taught for four years before the introduction of the NNS and she said:

> I did like that because I remember clearly learning long addition for example and long multiplication and I was just told lay your numbers out in the right place and then you do that and you get the right answer. Cross the number

> out, borrow it, even now at my age as I'm doing it I think I do that, I borrow from the next number. I say that in my head as I'm doing the sum on the paper. What I liked about the national [numeracy strategy] it was breaking it down and understanding what is happening to the number. I can't tell you how old I was when I went "oh is that what happens?" And I love doing it, I do like maths. It just made perfect sense. I learnt a lot about doing it that way.

Breaking calculations down into their component parts enabled Hasnia to enhance her knowledge of structures and methods, which she referred to as procedural, i.e. there was a lack of 'connections within mathematical concepts' (Askew et al, 1997: 341). She seems to have reflected on the NNS' informal methods of calculation, which precede formal, columnar calculations.

Webb et al (2004: 92) state that the NNS helped teachers understand the 'process of children's learning' which appears to have been affirmed by the following two responses. Meena reflected on the need for her school's calculation policy to have included steps of progression. She said:

> To make sure that all teachers are clear, particularly with fractions, of almost the stages of progression through the teaching of fractions, because if that isn't followed … and I would say in the NNS that was quite clear.

Molly referred to progression when she told me:

> I felt that the needs of the children were being met through the National Strategy that we had, you know the blue folder – the NNS. I felt it was addressing their needs in as much as it was set out what they needed to know, and how to progress from one step to another.

Meena spoke of the teachers' knowledge of progression, while Molly focussed on the pupils. Both teachers considered the NNS useful in terms of its content.

It was the pupils' needs that Molly considered when she reflected on the progression within the NNS and she perceived that the policy provided useful PCK. Challenging strategies such as formal calculations were preceded by informal, expanded methods that highlighted the key

concepts of place value and exchange. Molly's awareness of the pre-emptive strategies suggests that she wanted pupils to be secure in their understanding of these fundamental concepts.

Taluja and Tessa referred to the NNS' vocabulary booklet. Taluja said:

> The thing that sticks in my mind is the vocabulary book which you could just look to see ok I'm in year one, these are the vocabulary and things like that which I found was really useful.

Taluja gained security from having a resource that listed the year group appropriate vocabulary. Tessa's response suggests that teachers could have created their own definitions, which could be problematic. Tessa's response was:

> I think we had a vocabulary booklet. I remember that and it was really useful because it outlined the progression in vocabulary throughout the year groups and what you needed. I mean you can get all that on the Internet, you know you can Google that, but you wanted something that was, you know like the law to tell you that this is what you are supposed to be covering, so that it was clear to you.

Tessa's point that the booklet was 'like the law' suggests a need for a single source of PCK for all teachers that could facilitate consistent practice.

Hannah taught for four years before the NNS was introduced and by stating that she 'liked' the Framework she suggested the NNS contained useful PCK. Hannah referred to differentiation within her response, which was:

> I remember teaching from the NNS and thinking I liked the folder and how it opened. For the more able you almost had year one and two on a page and you could use it for your differentiation.

Differentiation involves teachers adapting their lesson input, the questions they ask and the activities they provide in order to meet the pupils' learning and attainment needs. Hannah suggested that the progressive content from one year group to the next enabled her to differentiate her teaching by using different levels of challenge.

Hannah's subsequent response also shows that the NNS was useful. She said:

> I do think there were elements of it that were very good. Like I said, the folder actually made them think about parts of their lesson and the balance between teacher talk and children's activities.

Within her retrospective interpretation of the policy Hannah recognised how her colleagues could have drawn on the NNS' pedagogy and reviewed their practice. She suggested that the balance between the teacher and his/her pupils had not been in place prior to the introduction of the NNS and that teachers became aware of new PCK through the Framework. Hannah reflected on her experiences as a class teacher from her current teaching position of head teacher, which led to her consideration of less experienced teachers.

The following three responses show how teachers accepted the NNS as part of their practice. Taluja, Tasha and Tricia spoke of the timings of the numeracy hour that outlined the structure of their mathematics lessons, which they considered useful. Their responses were as follows:

> I liked the way the numeracy hour worked. I felt that I knew I had my ten minutes, 40 minutes and ten minutes (Taluja).

> You had this is your ten minutes, this is your 20 minutes, this is the half an hour. I liked the structure and I liked that the children knew there would be this much of a mental oral, then it would be the teacher bit and then we would have a go and then we would come back and review (Tasha).

> I liked the fact it had a little clock, it told you how to break it down into really small steps of how many minutes each thing should be and exactly what you should be teaching. And I really liked that, I was really confident as a teacher using the National Numeracy Strategy (Tricia).

Taluja, Tasha and Tricia's policy enactments included their translations of policy, i.e. their pedagogy was constructed through their teaching experiences during their ITE. They recognised the numeracy hour as the structure of a mathematics lesson and therefore considered the PCK relevant.

Michelle's response shows that she gained confidence from the NNS. She told me:

> At that time it would have been fine because I was still finding my feet. I wasn't a confident teacher so I would have been 'okay this is what we have to do, this is what we will do, this is how we will do it'.

Michelle's interpretation of the NNS was that it was a means of support and reassurance. She seems to have reconstructed policy by enacting the NNS without adaptation. While her response suggests that she was a passive enactor of policy Michelle appears to have been autonomous by acting on her judgement that the NNS could increase her confidence. I revisit Michelle in phase three when she refers to confidence in the slightly different context of less experienced colleagues needing a mathematics scheme. It is interesting that she maintained her perception that policy can increase confidence in new teachers (see section 7.4 for details).

The NNS was useful when it provided PCK in terms of worked examples of calculations, progression, vocabulary, differentiation, talk and activities and the numeracy hour. The teachers who made a connection between the PCK content of the NNS and their own PCK were new professionals. Being managed by policy was beneficial as the teachers gained PCK that otherwise may not have been available. In this instance the new professionals were autonomous as they acted on their professional judgements that the NNS contained useful guidance.

In contrast the following seven responses show the disconnection that occurred when teachers perceived that their PCK was more relevant than the NNS. These responses show that the NNS was not useful. Teachers were new professionals who were managed by policy and lacked autonomy when the policy went 'over and against' their current practice (Ball, Maguire and Braun, 2012: 44).

Hasnia told me:

> I think back and remember thinking, 'it has to be 10 minutes, it has to be 10 minutes' because I suppose that's what they had said in all of the information that you were given. It was like stick to this rigidly and it will work, your levels or standards will improve and so people were probably in fear that if we don't do it exactly then it may not work. So perhaps it was just that this is what it

> says so this is how it is. Must do that 10 minutes, 20 minutes, half an hour, plenary thing so it's probably because that is what is said and the autonomy of the class teacher knowing her class, knowing what this child needs and what that child needs was taken away from them. So people thought okay if I am going to be directed and told to do this then I will do it exactly as it says. Who knows?

Fear of not doing what was expected appeared to affect Hasnia and she spoke of accepting the numeracy hour as part of her practice. Hasnia brought up the topic of autonomy and her response clearly shows how she lacked the freedom to act upon her judgement. Hasnia interpreted that the policy was meant to 'control, manage and transform education' (Ball, Maguire and Braun, 2012: 9) when she referred to all schools doing the same thing. Her consideration of teachers' autonomy as a head teacher exemplifies Burr's (2015) theory that experience influences people's understanding. I suggest that Hasnia was more aware of the reduction of autonomy because she is autonomous as a head teacher.

Dabria taught the NNS during her ITE and she had not found the numeracy hour useful. She told me:

> I remember that you were so time focussed that it has got to be 10 minutes I don't know if you were always listening to what the children were saying because it was like let's get the next thing ready because we've got to move on especially as we had lots of games and the mental oral starters were things like passing a teddy bear around, counting in twos and so on and I don't know if I was always listening to their chanting in twos because I was looking at the clock to think whether or not I had to move on.

Webb et al (2004: 91) refer to teachers' 'clockwatching' when teaching the numeracy hour, which reduced their spontaneity and creativity. Dabria's reference to not listening to the pupils infers that the numeracy hour was responsible for her compromised teaching and her pupils were negatively affected.

Tanya taught for 21 years before the policy was introduced and her response was:

> Things just seemed to change and different ways of working, different strategies of working out you know, multiplication, subtraction and addition. And ways in which the children had not become familiar with before. And the parents coming in all the time saying, "we don't know how this happens", so there were mammoth changes at that particular time.

Tanya perceived that the number of different methods (concepts and worked examples) in the NNS was too great and she seems to have been overwhelmed. Tanya's reconstruction of policy was problematic due to the differences in approaches between her current, well developed practice and those within the NNS. She did not appear to 'pick and choose' or 'ignore' the NNS, which Ball, Maguire & Braun (2012: 109) suggest teachers do as they reconstruct policy. Instead she appears to have accepted that the NNS had to be taught and was dissatisfied with the position in which she found herself.

Policy appeared to take control of Hasnia, Dabria and Tanya's practice, therefore they lacked autonomy. Their responses resonate with new professionalism as they complied with policy (Webb et al, 2004). The dissatisfaction of these teachers illuminates how new professionalism for experienced teachers can be a negative experience.

Planning is an event that teachers undertake to map out how they will teach the mathematical concepts, the questions they will ask, which pupils they will assess and how the assessments will be recorded. Maisie and Tanya had been teaching for seven and 21 years respectively when the NNS was introduced. Maisie said:

> Initially I remember planning it just took forever. It was almost as long to plan it as it was to deliver it. This is just ridiculous, this isn't right.

Tanya spoke of the level of difficulty she encountered when planning. Her response was:

> I think we had a very tricky planning format at the time. Trying to organise that at the time. The planning of it all was actually far more difficult than the teaching, imparting all that information across to the children and their learning. It was really the planning, there was just so much to get your head round.

Maisie and Tanya were dissatisfied with the NNS' planning yet the two teachers did not combine the NNS' planning with their own and take 'ownership' of the policy (Ball, Maguire and Braun, 2012: 92). They seem to have accepted the policy as the way to plan, thus the teachers did not have autonomy.

Tara was trained with the NNS. Her response relates to the duration of topics within the NNS' planning. She told me:

> I didn't like the unit plans anyway because it was just too much in one go, like a week's plan would normally last about three weeks or longer. You know one day would never be a day it would always be two or three days.

Tara adapted the policy from the outset and I suggest she was autonomous. Her response suggests that she did not accept the NNS as she applied her PCK and decided on the duration of the different topics. Tara reconstructed and remade policy as she prioritised her current practice over her enactment.

Deanna reflected on her colleagues' use of the NNS' planning. She told me:

> The numeracy strategy came out and then the unit plans came out which again I felt was very prescribed and using them, although they did say all over them this is not your planning, this is something you have to adapt for your class, but unfortunately they presented it as a weekly plan and so as maths coordinator in my last school I found that people thought "oh I have done my planning because I've got this sheet." I fell into that trap myself because I thought it looked good and you never look at it in enough depth so again that was there. As maths coordinator I threw all of the folders into a black sack after a while and told the teachers that they mustn't use them because it wasn't working, we were ending up with real gaps in the teaching. But then I used to find copies of them on the printer because they were downloading them anyway.

There are three parts to Deanna's response. Part one is her initial interpretation and reconstruction of the NNS, which relates to the NNS' planning. Part two is her reconstruction and

remaking (i.e. what she did) of the policy when she made the decision to remove the planning. Part three is her perception of her colleagues' responses to her instruction to throw away the NNS. Deanna was concerned about the negative effect of the NNS on pupils' learning.

Using the planning without looking at it in 'enough depth' shows how Deanna reconstructed the policy. There was an initial connection and Deanna gained security in her PCK through her adherence to the NNS' planning. A disconnection started to occur when Deanna evaluated her practice and she reflected that she had fallen into a 'trap'. This point suggests that it had been inevitable that she had not adapted the planning as it was presented as a helpful, completed part of her mathematics teaching.

Deanna made a further interpretation of the NNS and concluded that there had been a negative effect on the pupils' leaning. Her response supports Ball, Maguire & Braun's (2012: 10) point that policy can 'produce radical and sometimes unintended changes'. She then prioritised the pupils' learning over the use of the planning within her reconstruction of policy, she ignored the NNS and threw away the Framework folders. Deanna became part of the translation of policy as she applied 'imperatives and exhortations' (Ball, Maguire and Braun, 2012: 45) by speaking to her colleagues and telling them to stop using the planning, i.e. change their policy enactments. It seems that Deanna expected her colleagues' PCK to be secure and that they would be able to plan their teaching without the NNS.

The teachers' continued use of the NNS' planning without adaptation added to Deanna's reflection that the policy was not useful. Deanna's professional judgements were based on her PCK, which altered in accordance with her assessment of the pupils' learning. She remained autonomous and acted upon each of her judgements. It seems that Deanna wanted her colleagues to share her ideas. Her response illuminates how 'there is no simple accommodation between policy ideas, principles and the pragmatics of practice' (Ball, Maguire and Braun, 2012: 113). Her colleagues did not change their practice and appear to have perceived that the NNS' planning was useful for their practice.

Thus far the teachers' responses demonstrate how disconnections occurred in terms of the numeracy hour, concepts and worked examples of calculations and planning. However their professional judgements were not acted upon as Hasnia, Dabria, Tanya, Maisie, Tara and

Deanna (to varying extents) perceived that the PCK in the NNS had to be used. They updated their practice as they reconstructed the policy, despite being dissatisfied.

Three teachers found the NNS useful to some extent, which suggests that connections to policy were difficult. Deanna 'really liked' the teaching methods for division although she refers to division as problematic. She told me:

> The old NNS, there were lots of different types of calculation that they expected you to move through quite, not quickly but then there's different levels, I'm thinking of division when they were teaching number lines and then the chunking method, which I really liked although I know lots of people hated, but I didn't, I thought it was the next step from the number line. But anyway, that seems to have gone by the by because I don't think teachers did understand it.

Deanna drew on her mathematics specific knowledge and recognised the progression within the NNS' methods of division. She made a connection with the policy's PCK when she 'liked' and recognised its content as useful. It appears that Deanna reviewed and updated her PCK while recognising that her colleagues had been unable to do so. As discussed in section 5.3 Deanna wanted her colleagues to follow her instructions to throw away the NNS when she perceived that the pupils' learning had been negatively affected. This response suggests that pupils were not taught (or taught well) division by chunking. It is interesting that Deanna did not repeat her earlier action and instruct her teachers to teach what she recognised as progressive strategies.

There is a pattern among Deanna's responses to phase one. She reflected on how her colleagues had not adapted the NNS to meet the learning and attainment needs of their pupils. She also suggests that teachers struggled to teach long division. In both of these responses Deanna refers to teachers' PCK as insecure and therefore they were limited in their policy interpretations. I suggest that this perception is rooted in Deanna's current teaching position of deputy head. I revisit Deanna as a policy case within phases two and three as she maintains the construction of her understanding of her colleagues' PCK from her current perspective where her PCK appears to be secure.

Tianna trained with the NNS and she reflected on the unit plans. She made a connection to the NNS' planning that told her what to do. Nevertheless this connection was difficult as she suggested that she had no choice but to adopt the school's enactment of the policy. Tianna's response was:

> Those unit plans were something I clung on to and I think probably every teacher did. I think just because they were so rigid and told you what to do and where I'm at…the school, that's what we were using at that time to teach maths.
>
> I asked: How closely did you adhere to it?
>
> Tianna replied: Probably quite closely at that point. I think that was when I was in year four, so I probably followed them as a school, because that's what we did and so that's what I did.

Tianna's response was difficult to analyse as she spoke about her autonomy in terms of being a NQT who 'clung on to' the NNS' planning. At the start of her teaching career Tianna was free to use the planning according to her professional judgement. Later on she seemed to lack the freedom to make individual judgements and instead she joined into the school's response to the NNS.

Tianna interpreted and translated policy in terms of her school's culture, she was influenced by talking and meeting with her colleagues, which Ball, Maguire & Braun (2012: 44) describe as 'institutional activity'. She updated her enactment of the NNS in accordance with her colleagues' actions, she was affected by their 'professional dispositions' (Ball, Maguire and Braun, 2012: 111). Collaboration aids teachers' understanding of their practice and is conducive in terms of addressing 'the ongoing problems' related to policy enactment (Hargreaves & Goodson, 1996: 20). However collaboration for Tianna led to her adopting her colleagues' practice rather than benefitting from Wideen, Mayer-Smith and Moon's (1996) point that following collaborative discussion teachers consider what and how to change their practice.

Tara trained with the NNS and found the policy useful to some extent. She made a connection between her mathematics specific knowledge and the NNS when she considered the method of chunking for long division. Tara's response was:

> I think it gave you more flexibility in terms of what you were able to do. You could deviate from chunking but then go back to it, do you see what I mean? I didn't feel that I had to stick with chunking and do it until the kids knew it, whereas I could go and teach the roundabout route of chunking almost and then come back to it and say, "well now you know that this is how we do it" and fit it in to the chunking system or the chunking method rather. So I did feel that there was a bit more flexibility for subject knowledge and I could teach it in a roundabout way, just so then my kids would understand it and then come back to it so they would understand it a bit better.

Tara adapted the Framework when she provided additional teaching steps that facilitated her pupils' understanding of division. Her response suggests that pupils were positively affected by her adaptations of the NNS.

In sum, the responses to this theme support Ball, Maguire & Braun's (2012) theory that teachers interpret policy in terms of their current practice and experience. Shulman (1986) argues that teachers need to have PCK. Teachers found the policy useful when they made a connection between the NNS and their own PCK. These teachers appeared to have benefitted from the structure and detail contained in the NNS, thus they were new professionals. It is interesting that the 11 responses came from teachers with four or fewer years of teaching experience. The responses of Hannah and the four NQTs (Taluja, Tasha, Tricia and Michelle) oppose Maguire, Braun and Ball's (2015) idea that NQTs do not invest in policy as they need to survive their first year of teaching. Instead, the PCK within the policy was useful in their day to day mathematics teaching. However, rather than have a reduced autonomy as Hargreaves (2000) and Evans (2008) suggest their responses demonstrate how they were autonomous as they selected the parts of the policy they judged as useful.

The teachers' evaluations of the usefulness of the NNS develop Spillane's (1999) argument that it is teachers' capacity to make changes that affects their responses to policy. I.e. teachers' current

PCK determines their understanding of the mathematics in the policy and their ability to review and update their teaching. Instead, teachers evaluated the topics in which they could make a connection as they contained new and potentially beneficial PCK.

The responses of ten teachers who found the NNS useful to some extent and/or not useful have shown an acceptance of the policy when teachers felt that they were responsible for its enactment. Tara made a connection between her PCK and the NNS which positively affected her pupils. There was a disconnection for Hasnia, Dabria, Tanya, Maisie, Tara and Deanna as they perceived that their professional judgements were more relevant than policy. Connections became difficult for Deanna and Tianna. When teachers perceived that the NNS had to be enacted they were not autonomous. Despite their dissatisfaction these teachers spoke of the need to change their practice in accordance with 'the government's definition of what works in schools' (Webb et al, 2004: 90). There appears to have been tension between new professionalism and policy enactment and the responses demonstrate how teachers were managed and controlled by reforming policy (Hargreaves, 2000, Evans, 2008, Ball, Maguire and Braun, 2012).

5.4 Prescriptive practice

I now consider teachers' responses where they referred to the NNS as prescriptive, which affected their practice. Prescriptive in this context refers to rules stating what must happen. None of the teachers found the PNS useful, which is unsurprising as the term prescriptive has the negative connotations of de-professionalising teachers and reducing their autonomy (Ozga, 2000, Adams, 2014). The NNS contained a number of worked examples and suggestions regarding the coverage of mathematics topics and pupils' progression (DfEE, 1999). The policy was considered 'highly prescriptive' in terms of the level of structure and the specific teaching methods it contained (Adams, 2014: 63).

I decided to include prescriptive practice as a theme even though there are only three responses, which could have been included in the previous theme of PCK, policy and professional judgement. However, the idea of policy being prescriptive occurs as a theme in phase three and I make comparisons between the two phases later in this thesis (section 8.2). The key finding is that teachers' autonomy is affected by their interpretations of what the policy meant to their

practice. Table 5.5 summarises the responses for this theme and shows that the NNS was useful to some extent or not useful.

Table 5.5: Teachers' responses to the theme prescriptive practice

Name	Teachers' perceptions of the usefulness of the NNS
Molly	Useful to some extent
Heather	Useful to some extent
Taluja	Not useful

Two teachers did not find the NNS useful and one found it useful to some extent. Teachers reflected that the prescriptive detail contained in the vocabulary booklet and the NNS' planning had an effect on their practice and also their pupils' learning. The three teachers interpreted and translated the policy in different ways and constructed their professionalism in terms of their autonomy. They spoke of prescriptive practice when I asked "to what extent do you feel you have exercised autonomy in terms of teaching mathematics before, during and after the PNS?"

Heather reflected on two policy events; the introduction of the NC and the NNS. She told me:

> I felt like people did what they wanted frankly. I was actually very pleased to see the National Curriculum come in, very pleased to see it come in because I think for the children it was a lottery. If you got a teacher that understood maths, or anything to be honest, if you've got a good teacher you got a good education and if you didn't get a good teacher who knows what you learnt. Who knows? And then the National Curriculum came in and it tightened everybody's practice and it meant that you knew how much you had to get through in a week, how much you had to get through in a year, which people didn't have before, there was a lot of floating about I think. I remember standing in the stock cupboard at 9:10 while the children were in assembly and a colleague who was very creative going, 'look at that pink paper what can

> I do with that this morning?' And I said 'do you not know what you're teaching this morning?' 'No, but look at that paper' and of course by the end of the morning there was something glorious with pink paper but can you imagine that now? I think we have been reined in by the National Curriculum but perhaps we had more leeway then. Then when the Numeracy Strategy came in it was quite prescriptive.

The NNS was useful to some extent as it addressed Heather's concern that when teachers were autonomous pupils' education 'was a lottery'. Her reference to the NNS as 'prescriptive' suggests that the policy reduced teachers' autonomy due to its specific mathematical content. Heather suggested that pupils had benefitted from teachers' enhanced practice, which builds on her earlier comment where she stated that the NNS 'supported' teachers in terms of their PCK.

Both of Heather's responses thus far allude to the benefits of the NNS for teachers and pupils. Teachers' PCK was enhanced by the Framework and the prescriptive nature of the policy reduced the potential for pupils to receive an inconsistent and potentially damaging mathematics education. The prescriptive nature of the policy was limiting for teachers' autonomy, which benefitted pupils. It seems that Heather's reflection of autonomy was affected by her current teaching position as a head teacher. She reflected on the need for consistency of teaching in order for pupils to make progress for which she was ultimately responsible.

Molly's response shows how the NNS had been useful to some extent due to its prescriptiveness. Molly compared the NNS to the PNS and she said:

> I think there was quite a bit of autonomy before, although we had the NNS, it wasn't so prescriptive about when, and what have you. So I felt that I could exercise quite a bit of autonomy then.

Molly had taught for four years prior to the introduction of the NNS. She alludes to the NNS being prescriptive, while also stating that she had been autonomous. In an earlier reflection Molly referred to the NNS as useful in terms of setting out progression that enhanced her PCK. Molly was autonomous when she was able to decide 'when' concepts were taught, which appears to reinforce or have been reinforced by her perception that the NNS' progression was appropriate.

Her reference to prescriptive practice seems to relate to the PNS' planning blocks that stated when topics should be taught and the duration of the teaching (e.g. a two week block). Molly went on to experience a loss of autonomy when planning from the PNS. I re-visit her within my analysis of phase two (section 6.4.1) to show that her reflections were affected by the policy phases.

The final response from Taluja emphasises how the term prescriptive also relates to teachers' practice in school. She reflected:

> There are certain constraints, that actually our numeracy coordinator and consultants and things like that, they were telling us that it had to be a certain way, and we were being picked up when it wasn't, that actually we just had to, like sheep, almost do as we were told.

Taluja was trained in 2004 when the NNS had been in situ for five years. She reflected that she was not autonomous due to the 'constraints' of being told what to do. I suggest that Taluja alluded to school autonomy, i.e. that the professional judgement of her colleagues (possibly the SLT) led to the expectation of a collective response from the teachers. She appeared to experience 'imperatives and exhortations' to get policy done, which affected Taluja's translation of policy (Ball, Maguire and Braun, 2012: 45) and she seemed to lack individual autonomy as an outcome.

These three contrasting responses show that teachers perceived that the NNS brought about prescriptive practice, i.e. the policy stated what should happen. Heather recognised how teachers became new professionals, which reduced their autonomy while benefitting the pupils. Her response supports Webb et al's (2004) argument that policy can enhance teachers' practice. While recognising the NNS as prescriptive Molly appeared to maintain her autonomy. Taluja's response reinforces Ball, Maguire & Braun's (2012) idea that policy enactments are affected by a school's values and interests.

5.5 Summary of findings for phase one

Teachers' responses were based on their evaluations of their practice and the NNS, which supports Burr's (2015) theory that people see the world in different ways. Teachers interpreted

the NNS as a means of professional development as it contained new and useful PCK. Five teachers enacted the NNS as part of their ITE and knew of no other way (Scott, 2000, Webb & Vulliamy, 2007) of teaching mathematics. Their responses echo Basit's (2003) claim that NQTs were significantly impacted by the NNS as they had no other teaching approach. Four experienced teachers recognised where the policy could enhance their practice. For example, Danica benefitted from the glossary booklet and suggested it could enhance her colleagues' PCK. All nine teachers were autonomous as they made professional judgements of how the NNS could enhance their practice that they were free to act upon. One exception to this summative point is Tahreem who was autonomous to the extent of making a judgement but unable to act as she required greater detail than the NNS contained. My findings resonate with Spillane's (1999) point that teachers gain professional development according to their capacity to recognise potential enhancements and make changes to their practice.

Ofsted (2002) argue that the NNS' national training programme was successful in improving teachers' subject knowledge. However not all teachers received the same training experience. Teachers interpret training events in different ways, according to Brown et al (2000). Only two teachers from my sample reflected on the training, most likely because I asked them about the guidance and support they received but I did not explicitly refer to the training programme. The contrasting responses from Maisie and Terry show that the effectiveness of the training was based on whether or not the training met their individual professional development needs, as suggested by Storey (2009).

With regard to the effect that teachers' teaching positions had upon their responses Deanna's response shows how her reflection of her experience as a teacher strengthened when she reflected from her leadership position. Other examples of strengthened responses came from Hannah, Maisie and Tanya who considered colleagues' responses within their reflections. Dabria provides a further example when she suggested that she blamed the NNS for her compromised teaching as she reflected from her position of deputy head. Thus, my findings support Burr's (2015) theory that experience affects people's construction of knowledge.

I have argued that PCK is unique to each teacher who interprets policy in accordance with the security of their own knowledge and their capacity to recognise new PCK in the NNS. Thus there

is a relationship between policy and teachers' professional judgement. Teachers made connections when they reviewed and/or updated their PCK as they enacted the NNS. I have demonstrated that 11 teachers became new professionals as they were managed by policy while simultaneously being autonomous through their selection of PCK topics from the NNS (e.g. the numeracy hour). In contrast, there was a disconnection for ten teachers who suggested that their PCK was more relevant than the NNS. NQTs and experienced teachers prioritised their enactment of the NNS over their professional judgements when they perceived the policy had to be taught.

The expectation to comply with policy (Evans, 2008) coupled with the level of structure and content within the NNS (Adams, 2014) contributed to teachers' perceptions that the NNS was prescriptive. I have argued that the level of prescriptiveness was associated with a loss of autonomy for two teachers of contrasting experiences. Heather's autonomy was twice reduced with the introduction of the NC and then the NNS. Taluja was a NQT whose colleagues expected an adherence to the NNS, i.e. school autonomy, which reduced the sense of autonomy she had accumulated while on her ITE course. These teachers became new professionals who had to comply with policy reform (Evans, 2008). Molly's autonomy remained despite acknowledging the NNS' prescriptiveness. My findings clearly demonstrate how autonomy is uniquely personal as teachers draw on their experience and their PCK to make their professional judgements.

Chapter Six – Pressure, criticality and professional judgements in phase two

6.1 Introduction

Phase two relates to the period 2006-2011 when the PNS was current policy. The PNS contained mathematics planning that was separated into subject related blocks, e.g. counting, partitioning and calculating. These blocks were broken down into units of subject specific content that could be taught in two to three weeks. The policy provided ideas and resources using pupil appropriate language to support teachers' planning and differentiation (DfES, 2006).

The following responses address my research questions, which are:

1. What are primary teachers' reflections on their responses to three phases of the PNS?

2. What are their perceptions of the effect these responses had upon their experiences of teaching mathematics?

3. How are responses similar or different between each phase and within the phases?

The aim of this chapter is to examine the teachers' responses to the PNS. I then analyse these responses in terms of teachers' policy enactments and their professionalism. I make comparisons to my findings from phase one to show similarities and differences between the two phases. Throughout the chapter I refer to the policy cases of Deanna, Heather, Michelle and Tina as well as Molly. Three themes emerged, which are:

- Pressure
- The PNS was a means of professional development
- PCK, policy and professional judgement

The responses in phase two differ from those in phase one. My argument focuses on the teachers' critical stance to the PNS, which is greater than their responses to phase one and concurs with Kelchtermans' (2005) argument that teachers' current policy enactment is affected by their responses to their previous policy enactments. As the PNS superseded the NNS the teachers within my sample made comparisons to their previous experiences and policy

enactments (with the exception of Tallula). These previous experiences and subsequent reflections led to teachers being critical of the policy when they perceived there to be a misalignment. In addition teachers felt that they had to enact the PNS despite their dissatisfaction, which also occurred during phase one.

All of the teachers within my sample with the exception of Hannah, Tanya, Tasha, Tianna and Tricia are included within this chapter. Hannah was a deputy head teacher when the PNS was introduced and did not reflect on her mathematics teaching practice. Tanya's response was, 'Oh no, not another thing to do' and she continued to reflect on the effects of the NNS. Tasha spoke in depth about the NNS and only reflected that the PNS had not had 'a massive impact'. Tianna said that she did not remember the PNS. Tricia had been on maternity leave in 2006 and had returned to her school as a supply teacher. She spoke in depth about the NNS and lamented its removal, which she said was 'like the rug being ripped out from underneath you'. Thus 24 teachers are included within 33 responses.

Table 6.1 summarises the number of teachers who suggested that the PNS had been useful, not useful or useful to some extent. I have included the length of teaching experience teachers had in 2006. Within the following discussion and my concluding chapter I refer to how teachers' experience affected their responses.

Table 6.1: The length of time teachers had taught and their perceptions of the usefulness of the PNS (phase two)

Length of time teaching/policy was useful, not useful or useful to some extent	Policy was useful	Policy was not useful	Policy was useful to some extent
0-5 years	Dom Miranda Tahreem* Tallula Tara Tessa	Dabria Dom Miranda Taluja Tina	
6-10 years		Danica Harry Michelle Terry Tracey	Meena Terry Tony
11-15 years	Daisy Molly Tabitha	Deanna Hasnia Maisie x 3	Deanna

		Molly	
16-20 years		Holly	
21-25 years			
26-30 years		Heather x 2	Heather

The first theme is pressure, which affected teachers in phase two only. A key finding within this theme is that head teachers were concerned about the lack of school autonomy. The autonomy of teachers who were involved in the ISP was limited due to their need to address their situation. There are only six teachers' responses in this theme however I selected it for analysis for the following reasons. Pressure was the only theme in which teachers of the same teaching position (three head teachers) spoke of similar experiences. Also, teachers who experienced the ISP used what I consider powerful terminology, such as 'non-negotiables' (Danica) and 'under the microscope' (Taluja). I consider the teachers' experiences significant as they capture how phase two differs from its predecessor in terms of the teachers' critical responses.

6.2 Pressure

Pressure is passed from the government to schools and on to class teachers within the 'delivery chain' (Ball, Maguire and Braun, 2012: 75). Teachers become directed by policy in order to achieve the targets set by the government for pupils' attainment and to maintain their professional integrity amongst their colleagues (Perryman et al, 2011).

The following table (table 6.2) summarises teachers who appear in this theme along with the types of responses. Two sub-themes show how pressure was experienced in terms of having to enact the PNS or when teachers experienced the ISP.

Table 6.2: Teachers' responses to the theme pressure

Name of teacher	Teachers' perceptions of the usefulness of the PNS
Pressure to enact the PNS	
Hasnia	Not useful

Heather	Not useful
Holly	Not useful
Pressure and the ISP	
Danica	Useful
Taluja	Useful
Terry	Not useful

The following responses arose from my question regarding factors that influenced teachers' enactments of the PNS. Teachers perceived that they had limited choice in terms of their enactment while they experienced pressure. Two teachers found the policy useful while four teachers had not found it useful. The policy was useful when teachers perceived that it provided a route out of the ISP. Conversely the PNS was not useful when teachers felt pressured to enact it despite believing that they had adequate systems in place.

6.2.1 Pressure to enact the PNS

The first sub-theme of pressure to enact the PNS includes responses from three head teachers. Hasnia became head teacher in 2006, the year the PNS was introduced and therefore her reflections came from a head teacher's perspective. Heather and Holly became head teachers in 2010 and 2014 respectively and their reflections were of their experiences as class teachers. The PNS had not been useful for these three teachers who interpreted the policy and perceived that their practice needed to change regardless of their viewpoint and they experienced what Ball, Maguire & Braun (2012: 84) refer to as 'pressure to perform'. They did not have the chance to develop their school's autonomy.

Hasnia expressed concerns about following instructions in phase one when she said that all teachers had to do the same thing (i.e. teach the numeracy hour). In phase two Hasnia referred to having to do as she 'was told'. She told me:

> Somebody somewhere did their research and the government said, "That's a good idea, let us put that out everywhere, this is what we expect of our teachers." So the government interfered again. We just did it because I was being told I had to do it. I'm getting paid to do a job, somebody somewhere

> says this is the best way to do it, I am going to do it. I was numeracy leader at the time so I went to the training and was told these are the things you have to do, this is the way and I had to go back to my school and say this is a national strategy and this is how we are going to do it.

Hasnia appears to have been dissatisfied that she had to comply with policy, which she associated with the government's interference. By advising her colleagues to follow instructions Hasnia's perception of pressure may have formed part of her colleagues' translation of the PNS. I discuss this point in terms of Ball, Maguire & Braun's (2012) policy enactment theory in section 8.5.

Holly was frustrated that in her view her school needed to enact the PNS as soon as it was introduced. She spoke of not having time to review her current mathematics teaching and not being able to make an informed interpretation of the policy. Holly reflected:

> I think a lot of the information that you got through local authorities, whenever any of the strategies changed or were put into place, was that you had to do it as quickly as possible. Put things into practice just as quickly as possible and they put a lot of pressure on schools to achieve a lot quicker than would probably have been advisable.

Holly went on to say:

> From my perspective as a head the biggest problem I have with those meetings is that the teachers go, they get told something, they come back and again feel that they have to do it because it's come from the authority, it's come from the coordinators and it's still if all of those schools are doing it like that then we have to do it like this as well. But let's look at where we are now so we can think do we have to jump on that bandwagon or are we covering it already?

The mathematics network meetings that took place at the local authority appear to have added to Holly's frustration. Her colleagues seemed to perceive that all schools needed to respond in the same way. Heather's response resonates with Holly in terms of being frustrated. She said:

> In comes something new and we all change everything that we have been doing to try and accommodate everything the government wants us to do and we all try and do that. But I have to say it did feel as if we were throwing out the system that was really working quite well and going into something that we didn't think quite made sense but you adapt and you use it because that's what you have got to do.

Heather made reference to her school's lack of autonomy when she reflected that the PNS replaced the current system and that her colleagues and herself adapted their practice. A pattern of having no choice has emerged as Heather made reference to being 'reined in' during phase one. In phase two she appears to have wanted to act upon her professional judgement and continue to use her school's system. She perceived that she lacked the freedom to do so due to the pressure from the government for schools to enact the PNS.

These three head teachers were pressured by the perception that they needed to work to 'others' agenda' (Perryman et al, 2011: 187) without the consideration of their school's situation. They appear to have wanted their schools to be autonomous and to have decided how the PNS could align with their current practice. Their responses appear strong as they constructed an account that maintained their credibility as head teachers who should be autonomous, which according to Burr (2015) aids people's justification of their experiences.

Hasnia's response suggests that she was dissatisfied with events while Holly and Heather appear to have been frustrated as they considered the 'school's position in relation to policy' (Ball, Maguire and Braun, 2012: 44). They did not perceive that they had autonomy neither did they consider that they were free to evaluate the PNS and make gradual changes. Their responses support Berry's (2012: 404) argument that school leaders experience 'downward pressure' from 'governmental decisions' which are 'filtered through their managerial actions' to their colleagues. These three teachers' responses develop my earlier point that schools can be autonomous when teachers reach a general consensus of practice that is not replaced when new policy is received.

For teachers whose schools entered into the ISP pressure was experienced in a different way, which I now discuss within the following sub-theme.

6.2.2 Pressure and the ISP

The ISP was designed to provide intensive support to schools where fewer than 50% of the pupils achieved the minimum attainment of level four within the national tests. The ISP stated that some schools had not been able to raise standards, despite having had the NNS (DfES, 2004). Although nine teachers from three of the five schools in my sample had been in the ISP only three teachers mentioned the Programme. Regardless of the small number of teachers I wanted to make the point that being directed by policy supported these teachers' need for their schools to progress out of the ISP.

The teachers I now discuss are members of their school's SLT. Danica and Taluja taught for seven years and two years respectively and found the PNS useful. Terry had ten years' experience and he did not find the PNS useful. The following responses highlight how teachers adhered to the PNS, albeit in different ways. Although the PNS was considered useful in terms of abating the pressure of the ISP my argument is that there were implications for teachers who enacted the policy e.g. a loss of autonomy.

Danica said:

> I think we followed it quite closely because as I say we had, because of the situation that the school was in at the time and it was a case of needing to follow it quite closely and making sure it was quite explicit, we had some difficult, I suppose staffing issues as we moved into that sort of new phase of the school's history at the time. So it was, we had to set a lot of non-negotiables with our staff and it really was a case of, 'this is the way we are doing it' and I think just because that was the message that we were having to deliver as a SLT because of the Intensive Support Programme and the raising attainment plan that we had in, there wasn't really any room for people not to be buying into it, or not doing it as we wanted it to be done, which is why I think we followed it quite rigidly really in terms of what was being recommended.

Danica appears to have contributed to her colleagues' translation of policy as she delivered a message that contained a sense of urgency and an expectation of compliance. Teachers were

told that they had to act in a certain way and that there was no alternative, meaning that their autonomy was limited.

Taluja spoke of the ISP consultants visiting her school and observing lessons when she told me:

> We were under the microscope from the borough a little bit, we were part of the new Intensive Support Programme so we did have a lot of literacy and maths consultants coming in and advising. I think as a new teacher I followed it rigidly and I know that, I remember people been very strict if they came in and observed you.

Ball, Maguire and Braun (2012) state that schools can be supported by their LA colleagues, which did not seem to have been the case for Taluja. Instead she perceived that the consultant was checking that teachers were enacting policy, which was a form of pressure.

Taluja's translation of policy shows that she was a recipient of what Ball, Maguire & Braun (2012: 45) refer to as 'imperatives and exhortations' to get policy done. In contrast, Danica reflected upon her authoritative role in which her sense of responsibility to influence her colleagues' actions (i.e. their translation of policy) was evident.

Terry's response shows his fear that he might have taught a different method to those stated in the PNS. He said:

> I tend to just go and ask to see what is advised, particularly as we are so accountable that, if someone was to come in and observe my lesson and I was teaching finding the difference using the number line, I'd be shot at dawn if we're supposed to be doing column subtraction.

Terry indicated that he might have taught using the number line rather than the method stated in the PNS based on his professional judgement. He reflected on his school's practice of lesson observations where the expectation was that teachers were adhering to the PNS. He made sense of the policy in terms of what he had to do, which was to teach the PNS' methods. Terry's reconstruction of policy was underpinned by his sense of fear of reprisals. His response follows an earlier reflection that his school had been placed in the ISP and was in a 'vulnerable place' and

concurs with Perryman et al's (2011) point that teachers who are under pressure can be managed by policy.

In addition, Terry's response is indicative of how policy could 'steer the actions and behaviours of people' (Rizvi and Lingard, 2010: 4). Had Terry been observed teaching a different method there would have been negative consequences, he referred to 'a whole catalogue of steps' that follow an 'unsatisfactory lesson'. His reputation as a member of the SLT might have been damaged along with the possibility of additional observations to monitor his enactment. Terry might have had to attend training or receive capability procedures.

Terry's response echoes Webb et al's (2004) view that teachers working in an accountability culture, i.e. being part of the ISP are subject to controlling mechanisms such as lesson observations. Even though Terry knew a range of methods his response supports Smith's (1976: 13) claim that policy can 'prevent decisions and restrict choice' as he could not select what he considered the most appropriate method for his pupils. Therefore he prioritised his enactment of the policy over his professional judgement.

These three teachers wanted an abatement of the pressure they were experiencing. Their interpretations of the PNS coincided with their 'school's position in relation to policy' (Ball, Maguire and Braun, 2012: 44) and the perception that the PNS facilitated their progression out of the ISP. The 'pressure to perform' (Ball, Maguire and Braun, 2012: 84) limited their interpretations of the PNS. Their use of strong terminology appears to show the necessity of taking action and I suggest they saw the policy as the provider of safe and reliable processes.

With regard to autonomy these three teachers made professional judgements to enact the PNS and were free to take action. However, their professional judgement was affected by the pressure experienced as part of the ISP therefore I suggest that their autonomy was limited. in addition Danica's message to her colleagues had the potential to limit their autonomy. The responses echo Perryman et al's (2011: 187) findings that teachers' choices are limited when they are obliged to respond to 'intervention strategies'.

To summarise, the teachers' responses illuminate Coburn's (2001) point that teachers make choices in relation to an outcome as teachers wanted abatement of the pressure and/or for their

schools to progress out of the ISP. The teachers' enactments of the PNS were affected by the pressure they were under to meet a range of outcomes. Pressure was experienced in different guises, from teachers' interpretations of policy, the actions of their colleagues or as a result of being in the ISP. Teachers' responses to the pressure they experienced included frustration and a perception that the PNS had to be enacted, despite their professional judgements thus their autonomy was reduced. All of the responses infer that the teachers were frustrated at what Perryman et al (2011: 187) suggest is 'having to work to others' agenda'.

The second theme in phase two includes teachers' perceptions of how the PNS was a means of professional development.

6.3 The PNS was a means of professional development

The following reflections show a repeat of the theme professional development from phase one with a shift in teachers' perceptions. The PNS was perceived as a means of professional development when five teachers elicited helpful guidance and practical ideas from the policy, which NCETM (2009) cite as effective professional development. Five teachers considered the policy as a source of supplementary guidance demonstrating critical responses to the PNS as opposed to accepting it as a means of professional development. I refer to teachers' PCK in a general sense, e.g. mathematics specific or learning and attainment, in order to focus on how their responses highlighted professional development.

The ten teachers reflected upon their professional development in response to my questions regarding guidance and support. Within table 6.3 there are eight responses that show that the PNS was useful or useful to some extent. Two responses allude to one teacher who found the policy useful to some extent and one teacher who had not found the PNS useful. Teachers reflected on their policy enactments in phase one and their professional judgements appear more informed in terms of how the PNS enhanced their practice.

The teachers' responses emerged into the following two sub-themes:

- Professional development in the form of helpful guidance
- The PNS was supplementary guidance for teachers' current practice

Table 6.3: Teachers' responses to the theme the PNS was a means of professional development

Name	Teachers' perceptions of the usefulness of the PNS
Professional development in the form of helpful guidance	
Daisy	Useful
Miranda	Useful
Molly	Useful
Tahreem*	Useful
Tallula	Useful
The PNS was supplementary guidance for teachers' current practice	
Heather	Not useful
Terry	Useful to some extent
Tabitha	Useful to some extent
Tessa	Useful to some extent
Dom	Useful to some extent

6.3.1 Professional development in the form of helpful guidance

This sub-theme emerged following five teachers' perceptions that their practice was enhanced through their enactment of the PNS. The key finding is that the PNS provided PCK that teachers were able to recognise and understand. Tallula's response underlines Webb et al's (2004: 92) view that policy can be beneficial in terms of stating specifically 'what [teachers] were doing and why'. The level of detail in the PNS was helpful to Tallula who was a NQT in 2006. Her response was:

> I found it quite hard to look at an objective and know how to teach it or what activities to do. I used to think that I knew what they need to know, how to partition but I didn't have the experience to know how to teach it, whereas I felt with the strategy, I felt it gave you teaching ideas, they didn't just give me an objective that I had to work out how to teach.

Tallula's response resonates with those from phase one in terms of how policy provided detail that enhanced teachers' practice. She appears to have accepted the PNS and developed her

PCK according to 'what works' (Webb et al, 2004: 90). Within her interpretation of the PNS Tallula made sense of the policy by focussing on its suggested teaching methods. She made a professional judgement and had been free to benefit from what she perceived were useful 'ideas'. She appears to have achieved attitudinal development, which according to Evans (2008) occurs when teachers accept and commit to changes in their practice brought about by policy reform. Tallula benefitted from being managed by policy, i.e. she was a new professional (Hargreaves, 2000, Evans, 2008).

Daisy and Molly taught for 14 and 11 years respectively when the PNS was introduced and both teachers taught mathematics prior to the introduction of the NS. Daisy said:

> That's the plus of the PNS - it gave you ideas of things you can do. It did give you some ideas of how to help children think outside the box every now and again and so once you have got that background behind you - you can then go on to employ it elsewhere.

Meanwhile, Molly reflected that the PNS helped her meet 'the needs of the children' within her response:

> I did find helpful resources and things and other documents that were produced alongside that did definitely help and address needs.

There is a recurrence of Molly's perception that policy contains PCK. In phase one she benefitted from the NNS' content regarding pupil progression and her enhanced PCK benefitted her pupils' learning. Molly's response echoes how she related her policy enactments to meeting the needs of her pupils, i.e. she selected aspects she considered relevant. Her ability to enhance her practice from the PNS' resources suggests that Molly's PCK was secure.

Miranda and Tahreem are members of their school's SLT and taught for five years before the PNS was introduced. Miranda said:

> The progression through from unit one to unit two to unit three was also useful, it did help with progress and help show that across the year.

Meanwhile Tahreem drew on the Overcoming Barriers document as a means of professional development. Her response was:

> The Primary National Strategy I did find helpful because it came with a lot more detail how to do this, how to do that. There was children at level two, level three and then knowing, because by then I was in year two, 'So this is what they want for level two, this is what they want for level three and even for the more able this is what they want me to do'. I felt this I can cope with, differentiation became easier.

Tahreem's reference to differentiation being 'easier' suggests that she was able to gain professional development from the PNS. The issue of differentiation had been problematic for Tahreem in phase one as the NNS did not contain the level of detail she needed. It is possible that she was able to recognise the PNS as helpful because of her experience and she could now elicit guidance from policy.

6.3.2 The PNS was supplementary guidance for teachers' current practice

The five teachers who appear in this sub-theme drew on their PCK as they interpreted the PNS in accordance with how the policy could enhance their mathematics teaching. Thus, the term supplementary guidance demonstrates how teachers critically evaluated the PNS as a resource that could be drawn on for ideas that complemented their current practice.

There are five responses in this sub-theme. The responses came from Dom, Tessa and Tabitha who found the policy useful to some extent. Heather and Terry's responses show how the PNS was not useful or useful to some extent respectively. The key finding is that teachers were selective in the professional development they gained from the PNS. As there is a greater number of responses where teachers found the policy useful I turn to these first.

In his reflection of phase one Dom suggested his PCK developed through his enactment of the NNS. When reflecting on the PNS he said:

> I don't think I referred to it. I was teaching in year five and six and that's the kind of year groups I've always taught in, so I probably didn't refer to the document loads and loads. Because I knew what I needed, wanted to teach, I

> knew how I needed to teach it. I would refer to it for planning just to make sure that we are covering everything but if I then saw something I would then use my own experiences of how I'm going to tackle that objective. How I'm going to work my way through it.

Dom perceived that he was teaching the way he wanted and he referred to the PNS' planning for reassurance that he was 'covering everything'.

Similarly, Tessa referred to the PNS for reassurance that her teaching was pitched at the correct level. Tessa told me:

> I felt safe that I was teaching the correct, well not the correct thing but I was teaching to the level that I needed to teach to. It gave me the guidance to do that and then I could use the different material or different questioning from my own knowledge, my own experience.

Tessa's response resonates with her reflection of phase one where she drew on the NNS for planning guidance.

Tabitha focussed on the PNS' resources within her response when she said:

> I think resources, I would say was the main thing that I took because I already had quite a bank of resources from before. I knew what I'd used before with various other things that have been around.

Terry taught for ten years before the introduction of the PNS, which he found useful to some extent. His response includes his recognition that he used the PNS and adapted the policy when he prepared his pupils for their national tests. Terry said:

> So we knew at the end of the year we had to get the children to a specific level in SATs, so we would pick and use parts of various blocks and units and so on that we needed to use. I would say that we used it when we needed to and adapted as necessary.

Terry perceived that the policy was limited in terms of preparing year six pupils for their national tests.

These four responses demonstrate how the PNS had been useful to some extent. Dom, Tessa, Tabitha and Terry's experiences include their enactments of the NNS, which became a platform from which they critically evaluated the PNS regarding its capacity to enhance their current practice. Their evaluations show that they had the 'will and capacity' to change their practice (Spillane, 1999: 157). In addition the teachers' responses show how teachers who focus on their day to day teaching engage in selective professional development that focuses on their individual needs. The idea that policy can be perceived as guidance develops within phase three as teachers lamented the loss of policy, which I discuss in section 7.3.1.

The final response in this theme comes from Heather. She spoke of the prescriptiveness of the PNS along with the point that her teaching experience was useful. Her response was:

> I think that I was still very much teaching by what the children needed, so yes it was very prescriptive about what you do in each year group, but to be honest you had to go with what the children needed and I always feel that when anything new comes in like that, if you've had the experience of what's gone before you can actually manage it, because you go with what you know and you take on board what you have in the new strategy and you use what you can.

In this response Heather refers to her own practice and clearly argues that her experience informed her professional judgement. Heather had not found the PNS useful. Her interpretation of the policy was affected by her substantial policy biography that includes a number of changes over the past 30 years. She was autonomous when she prioritised meeting the needs of her pupils over her policy enactment. Heather suggested that the PNS provided professional development but teachers' PCK should take priority and therefore the policy was supplementary.

In phase one Heather spoke of the usefulness of the NNS to develop teachers' PCK. Simultaneously she considered that the prescriptive nature of the policy reduced her autonomy. These contrasting responses suggest the need for teachers to be autonomous. The PNS was

reviewed in a more critical way. Heather spoke of being under pressure to change her school's system and the need for teachers to be secure in their PCK rather than draw on policy, again advocating teachers' autonomy. I am therefore surprised that Heather purchased a mathematics scheme in phase three, which I discuss in section 7.4.

Looking back on Heather's response I notice that the pressure to enact policy appears to have decreased. It may be that pressure was not discussed as Heather reflected on her classroom practice rather than consider her school or her colleagues. Her reference to her experience and the professional judgement she made suggest that she considered her autonomy from the position of head teacher.

To summarise this theme, the PNS was seen as a means of professional development in a different way from phase one. Daisy, Miranda, Molly, Tahreem and Tallula spoke of the PNS being helpful guidance. Their responses develop Storey's (2009) point that teachers' practice can be enhanced as the teachers did not seem to be aware of their professional development needs until they engaged with the policy. These teachers experienced an increased capacity to make mathematical connections which NCETM (2009) cite as a result of effective professional development. They recognised where policy was beneficial and were motivated to change their practice, as suggested by Spillane (1999). When the PNS was useful to some extent Terry, Tabitha, Tessa and Dom focussed on their individual professional development needs. They selected what they considered was beneficial to their practice, e.g. topic coverage (Dom). Heather's response advocated her wish for teachers to be autonomous and thusly be selective in how policy enhanced their practice.

The final theme is PCK, policy and professional judgement to which I now turn my attention.

6.4 PCK, policy and professional judgement

This theme also appeared in phase one and the key finding repeats; there were connections or disconnections between the PCK of the teachers and policy. In phase two there is a greater level of criticality in the teachers' responses, possibly because they were more experienced at mathematics teaching and they had enacted the NNS. I selected their responses from their recollection of the launch of the PNS and my questions regarding how they felt about the strategy. Seven teachers contested the PNS yet felt that they had no choice but to enact the policy despite

their dissatisfaction and struggles. Their responses resonate with Ball, Maguire & Braun's (2012) argument that teachers' interpretation of policy includes their consideration of the consequences of non-enactment. The consequences could include capability or disciplinary proceedings, therefore teachers may have had little opportunity to resist policy. Included in this theme are ten teachers who prioritised their professional judgements and their PCK over their enactments of the PNS and either ignored or adapted the policy.

The teachers' responses emerged into three sub-themes, which are:

- Misalignments between the PNS and teachers' practice
- The PNS could be ignored
- Adaptations of the PNS

Table 6.4 shows the names of the 17 teachers who appear in this theme along with the type of response and whether they found the PNS useful, useful to some extent or not useful. I include topic headings in the sub-theme of misalignments between the PNS and teachers' practice to show the topic of the perceived misalignments. The topics show how teachers spoke about planning, the pace of pupils' progression and attainment.

Table 6.4: Teachers' responses to the theme PCK, policy and professional judgement

Name	Teachers' perceptions of the usefulness of the PNS
Planning	
Miranda	Not useful
Molly	Not useful
Pace of progression	
Deanna	Not useful
Maisie	Not useful
Attainment	
Dabria	Not useful
Heather	Not useful

Maisie	Not useful
The PNS could be ignored	
Dom	Not useful
Harry	Not useful
Maisie	Not useful
Michelle	Not useful
Tina	Not useful
Tracey	Not useful
Adaptations of the PNS	
Deanna	Not useful
Meena	Not useful
Tony	Not useful
Tara	Useful

It was teachers who were on the SLT who had not found the PNS useful. Seven teachers spoke of misalignments between the PNS and their practice and six teachers said that they ignored the policy. The teachers critically evaluated the PNS and made professional judgements regarding its PCK. They experienced struggles as they perceived that the PNS took priority over their experience and PCK, hence the policy was not useful. The responses of Deanna, Meena and Tony contain their perceptions that their enactment of the PNS took priority over their PCK. The PNS was not useful for these three teachers due to the tension between the PNS' coverage of topics and their professional judgements of how long they should spend on topics and when they should be taught. Tara found that the format of the PNS' planning enabled her to make adaptations and therefore she found the policy useful.

There are fewer PCK topics in phase two than there were in phase one. I suggest this is because the PNS contained planning rather than the worked examples of calculations and suggestions of teaching methods (for example) of its predecessor. The data in table 6.5 are slightly different to phase one as teachers did not refer to the PNS in terms of gaining security in their PCK. The single column shows that disconnections were made when teachers considered that their PCK was more relevant than the policy.

Table 6.5: The effect of the PNS on teachers' PCK

Topics in which teachers considered their PCK was more relevant than the PNS (disconnections)
Expectations of pupil attainment National tests Planning Progression

Maisie appears within this theme three times as she reflected upon the PNS' attainment, pace of teaching and also how she ignored the policy when she prepared her pupils for their national tests. I present the responses first as they are the greatest in number.

6.4.1. Misalignments between the PNS and teachers' practice

The following responses show teachers' perceptions of the misalignments between the PNS and their practice. Teachers' practice includes their PCK, their experience and their professional judgements. The misalignments relate to planning, pace of progression and attainment. These topics appear again in phase three and I explore this repetition in chapter seven.

Planning

The two responses that follow refer to the PNS' planning. Miranda's reflection was:

> I think they were slightly overwhelmed by the whole online-ness of it. Because obviously people were very used to the paper document and all of a sudden there wasn't a paper document. There was about six more layers to it in six of the documents, six places to retrieve information from so I think people were overwhelmed by it and just used the block and unit outlines rather than delving into the additional online resources.

Miranda suggested that she and her colleagues struggled with the amount of the PNS' planning and the need to access online resources. Her response resonates with Brown et al's (2003: 17) point that teachers will not engage with policy that they do not understand and will address the 'more immediately understandable aspects' instead (Brown, Askew & Millett, 2003: 17).

Molly said:

> I can remember not feeling so confident in terms of, not the actual teaching of maths but the planning. I think we all found the planning far more onerous for quite a while. I didn't find it nearly as easy to navigate. If you were using it online you had links from here to here so initially I found it very time consuming and not easy to navigate.

Molly appears to have struggled with the time it took her to navigate the PNS' planning that she perceived she had to do. She suggested that her colleagues experienced the same struggles when she said 'we all found the planning far more onerous'. I argued in section 5.4 that Molly's reference to having autonomy 'then' (i.e. during phase one) was an indicator that she was less autonomous in phase two. Molly's autonomy appears to have been reduced as she used the PNS' planning despite her professional judgement.

Molly became mathematics coordinator in 2007, the year after the launch of the PNS. She appears to have responded to the policy from her perspective of a class teacher whose PCK was secure, which explains her reduced confidence. I suggest that Molly also reflected from her position of mathematics coordinator whose colleagues struggled with the PNS and may have looked to her for guidance. Thus, her lack of confidence in the PNS' planning seemed more of a concern.

Ball, Maguire and Braun (2012) point out that teachers have a sense of responsibility to enact policy. It is interesting how Miranda and Molly referred to the struggle of being in a position to affect how mathematics was planned yet they were constrained by feeling that the PNS had to be enacted. Their contestations were strengthened when they reflected as mathematics coordinators whose responsibility extended to supporting their colleagues' planning. Hence, their understanding of PCK emerged and changed as they drew on their experiences as teachers and their current perspectives.

Pace of progression

In terms of the expected pace of progression within the PNS' planning Deanna and Maisie expressed slightly different concerns. Deanna responded to my question of how the PNS was launched when she said:

> Looking at how the units and blocks fitted together it seems to me that it was very prescriptive and very time bound, so you spent three days say on something and then you had to move on and I think that was a worry at the time, but what if the children haven't got it and we've got to move on to the next unit or block? That was a concern I think at the time. I think that it moved children on too quickly, it didn't allow for time to embed things.

There are similarities between Deanna's responses to the PNS and the NNS. In phase one her concern was that the NNS' planning had not met the learning and attainment needs of the pupils. Her response to phase two echoes this concern. Deanna said that there was potential for pupils to 'move on to the next unit or block' without having understood or embedded their previous learning. She suggests that teachers enacted the PNS without adaptation, which negatively affected the pupils as they moved onto new concepts without being secure in their current learning. Her earlier point regarding colleagues' insecure PCK is again evident. In Deanna's subsequent response (see section 6.4.3.) she reflected that she adapted the PNS in response to her pupils' needs. Hence a pattern is emerging of Deanna being secure in her PCK while considering that her colleagues' PCK was rooted in policy.

Maisie reflected on how much the pupils needed to learn before formal calculations were introduced. Her response was:

> We were muddled at first with what we should be teaching when and from an adult's point of view you could see progression, 'oh I can see how they could have got that, I get that', but it was so confusing for the children I think. We initially didn't think, well don't do that one or just leave that one because it's too confusing. It muddles the kids a bit, so I don't think that helped, there were too many stages in between before getting them to formal methods of addition, subtraction, multiplication and division which I don't think helped initially.

Deanna and Maisie taught prior to the introduction of the NNS and seem to have developed an extensive PCK through their experiences (as seen in their responses to phases one and two). Both teachers evaluated the PNS and suggested that their PCK was more appropriate.

Attainment

Teachers perceived that there was a gap between their pupils' attainment and the PNS' expectations. Heather's response was:

> I think before it had been quite clear about how children of different abilities, you went by their ability and if I remember rightly, tell me if I've got this wrong, it came in as what you would do in year groups. So I seem to remember staff who actually knew how to teach being thrown because they had children in particular year groups who were not performing in that year group's work.

Heather's colleagues appear to have been concerned that the PNS' planning indicated an expected level of prior attainment that their pupils had not achieved. The PNS' learning objectives state the prospective attainment for the forthcoming year, which was also problematic. The fact that experienced teachers doubted their ability to teach resonates with Heather's earlier reflection regarding the pressure she experienced to enact the PNS. She appears to have recognised that her colleagues doubted their PCK and lost their autonomy as their pupils were not at the PNS' expected level. This response to phase two contrasts with Heather's earlier reflection where she perceived that the NNS had been beneficial to teachers' PCK, particularly teachers who needed to develop their understanding. Heather appears to suggest that experienced teachers' PCK should have been more relevant than policy.

Heather's response changes the focus from school autonomy to teachers' autonomy, particularly for experienced colleagues who should have maintained their professional judgement regardless of policy expectations. Both of her responses support Ball, Maguire & Braun's (2012: 138) point that resistance to policy is 'rare' due to the 'pressures of performance'. In addition she constructed her understanding from her current position of an experienced head teacher who should have been autonomous.

Maisie made a similar point in her response when she said:

> Initially we felt very constrained by, 'you must teach this now, even though your children possibly aren't at that level yet, not able to do x, y, z'. So we felt very pressured that we weren't up to the expectations.

Dabria's focus was the 'low level' of her pupils in the early years. She told me:

> In early years it was quite tricky to juggle, especially when children are very new to school and especially in the type of school I was working in where children were coming in at a very low level in terms of age expectations and it felt like you just had to teach to the structure and if you didn't you would very quickly get behind.

Ball, Maguire & Braun's (2012: 44) point that interpretation of policy can be 'authoritative and authorial' was confirmed by Heather, Maisie and Dabria as they reflected on their perceived insufficient practice and accepted the policy's attainment expectations. They considered their schools' 'position in relation to policy' (Ball, Maguire and Braun, 2012: 44). The PNS was interpreted as informed and accurate regarding pupils' attainment, which reduced the teachers' confidence regarding their previous professional judgements.

Overall, the disconnection between teachers' PCK and the PNS led to these seven teachers critically evaluating their performance. They seemed to want to prioritise their PCK yet they suggested that policy knew best despite their perceptions that their pupil cohorts did not align to the nationally produced policy. Ball, Maguire & Braun's (2012: 90) argument that 'pragmatism and necessity trump wider responsibilities towards students' suggests that teachers prioritise their policy enactments over their concerns for their pupils when they recognise policy as controlling. The teachers' responses suggest that they lacked autonomy and they had not considered adapting or ignoring the policy despite their concerns. The implications of these responses were teachers' dissatisfaction and potential misalignments in the pupils' learning if they could not access the level and content of the mathematics. Their reconstructions of policy show how they presented the PNS as they perceived it was expected to be seen, i.e. there was no other way of teaching mathematics than to enact policy, as argued by Webb and Vulliamy (2007).

6.4.2. The PNS could be ignored

Six teachers spoke of ignoring the PNS in response to the disconnection between their PCK and the policy. I categorised their responses as suggestions that the PNS was not useful for their practice. I argue that these teachers were autonomous as they acted on their professional

judgements. The teachers were confident about their PCK and therefore felt free to ignore the policy and continue their existing practice.

Michelle said that the PNS Framework had not resonated as a policy to enact:

> I don't even think we focused on it as a scheme, as a maths resource to use. It was never flagged up as the be all and end all and you had to use it. It was just 'oh it's another folder'.

There are two possible explanations for Michelle's response. First, as discussed in section 5.3, Michelle gained confidence from her enactment of the NNS that she might not have wanted to disrupt. Second, she had not received policy messages that suggested the PNS should have been used. The combination of Michelle's confidence from the NNS and the perception that the PNS did not have to be used led to her ignoring the policy.

Dom and Tracey also ignored the PNS. Dom's response was:

> I trained with the NNS, it became the norm and enabled me to ignore the PNS, glide through that period and not necessarily be affected by it.

Tracey also referred to the NNS when she told me:

> If I'm honest I ignored it. Because actually in my view I didn't think there was much difference, it was just a more complicated way of doing the same stuff that you did before with the National Numeracy Strategy.

Dom and Tracey reflected that they ignored the PNS as they continued to enact the NNS.

Tina ignored the PNS because she missed its launch. She was on maternity leave in 2006 and upon her return to work she found that her colleagues were not enacting the PNS, instead they were using the West End (pseudonym) mathematics scheme. Tina returned on a part time basis and taught a range of classes as part of her role as a cover teacher for her colleagues' planning, preparation and assessment time. This meant that she used her colleagues' planning. Tina's response was:

> I found it really hard to understand how the units and blocks should have followed on from each other. I obviously assumed that had I used it, I would have picked up on it, I hope. I remember when I came back and when I did work with people, I was looking, perhaps looking at their planning. I know lots of people were using West End, because it has already been planned using the blocks and units, unfortunately I know. People were finding it really hard to get their heads around it, but in terms of actually ever using it as a planning tool, I don't recall using it.

Tina did not appear in phase one and her experience of the PNS is unique as she returned from maternity leave to find the PNS in situ. Tina found that she was out of date with current teaching practice and needed to catch up quickly. She was in a challenging situation as there was no time for her to collaborate with colleagues, where she could have shared her ideas and been part of the collective response (Wideen, Mayer-Smith & Moon, 1996, Coburn, 2001). Her response suggests a lack of motivation to use the West End mathematics scheme and also a lack of choice. Tina's response echoes Biesta et al's (2015) finding that teachers' autonomy is limited when they have a limited understanding of policy.

The use of mathematics schemes can be a source of support and guidance that enhances teachers' confidence, according to Haggerty and Pepin (2002) and Newton and Newton (2006). The West End mathematics scheme reproduced the PNS' planning in what Tina perceived as useful in terms of her need for survival, which placed her in a similar situation to NQTs (Maguire, Braun & Ball, 2015). Tina found the situation unsatisfactory and mitigated her actions by terming the use of the scheme as unfortunate. I revisit Tina as a policy case in the next chapter where her responses suggest that she experienced further complexities in terms of her policy experiences.

In contrast, Harry and Maisie prioritised their pupils' attainment and learning needs in preparation for the national tests over their enactment of the PNS.

Harry said:

> I tended to work more from individual children's abilities and groups and would tailor the support or the teaching to what they actually needed and there was a lot of filling gaps and a lot of catch up and a lot of intensive support for some children. So it wasn't, it didn't kind of lend itself to following the programme at that stage of their primary life.

Similarly, Maisie told me:

> Actually, I found it quite useful from February half term onwards when I thought, I wasn't told, I thought do you know what, these children don't need this. I always have the bottom group, I don't know why that keeps happening but it's like here we go again. But I didn't have those constraints telling me that you should be teaching this, this and this. I'm sorry but these children don't need this, they've got SATs tests to get through.

These two teachers drew on their PCK that appears to have developed through their experience of teaching year six and preparing pupils for the national tests.

Contrary to Ball, Maguire & Braun's (2012: 95) point that teachers take 'ownership' of policy by developing it into their practice these teachers took ownership of their practice, i.e. they were autonomous. Michelle was autonomous in her decision to ignore the PNS. Similarly, Dom and Tracey were autonomous as they continued to enact the NNS that they found useful. They suggested their PCK could not have been further developed by an interpretation of the PNS. These responses challenge Burr's (2015) point that the construction of knowledge changes as teachers gain experience and reflect on their experiences. Instead these three teachers interpreted that their 'custom and practice' (Ball, Maguire and Braun, 2012: 114) was more relevant.

Harry and Maisie were autonomous when they made the judgement to provide bespoke learning experiences for their pupils and they ignored the PNS. As long as their pupils attained level four or higher in the national tests they could teach the content and methods they considered appropriate. Their responses resonate with Robinson's (2012: 244) argument that adapting policy in a creative manner is beneficial for teachers who are responding to 'control mechanisms' such

as national tests. Tina had no capacity to be autonomous as following her return from maternity leave there was no time for her to make a professional judgement. Her actions were limited by the school's response to the PNS, which had been the purchase and enactment of the West End mathematics scheme.

6.4.3 Adaptations of the PNS

The following four responses are from teachers who enacted the NNS. The key finding within this sub-theme is that teachers considered their PCK more relevant than policy, hence there was a disconnection. Teachers prioritised their PCK as they made professional judgements to adapt the policy. All of the teachers appear to have been autonomous. Three of the four responses come from teachers who had not found the PNS useful. The responses of Deanna, Tony and Meena do not refer to a PCK topic, instead they reflect generally. I present these responses first.

Deanna and Tony reflected on their enactment of the NNS in their responses. Deanna taught for 12 years before the PNS was introduced and she told me:

> I think it's like anything, like the Numeracy Strategy before that was quite specific and prescriptive, but I think as things go on you relax a bit and you work within it and realise that you don't have to stick to it as strictly as perhaps you thought you had to to begin with.

Deanna considered that she could adapt the PNS. During phase one Deanna evaluated the effect of the NNS on her pupils' learning and attainment needs. She spoke of her concerns regarding the negative effect of policy that led to 'gaps' in the pupils' learning and therefore there was a need to ignore the NNS. Deanna's reference to working 'within' the PNS suggests that she drew upon the policy when she considered it was relevant to her teaching and her pupils' needs. This reflection shows that Deanna remained autonomous when she altered her practice over time and adapted the PNS according to her professional judgement.

A similar response came from Tony, who had been teaching for seven years when the PNS was launched. Tony's response was:

> Initially as a school we adhered very closely at the time because it was very structured, obviously not quite as structured as before that we did and then we

> sort of adapted as we went along and made it work for us. I think because of the predecessor, the NNS, was even more rigid in terms of timings and that sort of thing we were afraid at that point of veering too much away from the guidance, so initially we were very focused on the guidance in the PNS, then as we became more confident as a school and I became more confident as a teacher my school had moved away, adapted and made the documentation work for my class. Not what was necessarily prescribed at the time.

The policy biographies (Ball, Maguire and Braun, 2012) of Deanna and Tony led to them initially continuing their enactment in the way they had done in phase one by enacting the PNS without adaptation. Over time they realised that they needed to change their practice. Both teachers were free to adapt the PNS, which resonated with Robinson's (2012: 243) point that teachers will adapt policy in accordance with their 'professional judgement'.

Meena adapted the PNS from the outset. She told me:

> I can say I probably never followed it exactly as it suggests, because having worked with the NNS I had already worked out how long you need to spend on certain topics and I think I didn't necessarily agree with the amount of time the PNS suggested. I was an experienced teacher, I had already manipulated that according to what I needed in terms of what I thought the needs of the class were, so I've always adapted that anyway.

At the time the PNS was launched Meena had been teaching for six years. Her previous mathematics teaching included her enactment of the NNS and she taught overseas for a while. Meena's use of the term 'manipulated' implies that she prioritised her PCK over her enactment of the PNS and adapted the policy. Thus her autonomy appears to have been underpinned by her experience.

The response came from Tara who taught for two years before the PNS was introduced and found the planning content useful. Tara's response was:

> I did feel that it was better with the blocks and I was able to pick out from there how long it was going to take to teach it. And I could judge that.

Tara's interpretation of policy included retrospective sensemaking as she compared the structure of the PNS to the NNS' unit plans. She was autonomous when she made judgements regarding the duration of topics.

The four teachers within this sub-theme associated phase two with a time of having 'freedom to act' in accordance with their judgements (Pitt & Phelan, 2008: 191). The PNS was not useful for Deanna, Meena and Tony who questioned the relevance of the policy. Tara 'interpreted and reinterpreted' (Robinson, 2012: 232 & 233) her experience from phase one. All of the teachers who adapted the PNS were autonomous and I suggest that their professional judgements were underpinned by their experience.

The theme of PCK, policy and professional judgement can be summarised by teachers' evaluations of their practice and the policy, which resonates with how the theme appears in phase one. The extent of teachers' critical reflections of the policy can be seen when the ratio of the number of teachers who found the policy useful, useful to some extent or not useful is compared. The ratios are:

In phase one the ratio of useful : useful to some extent : not useful is 11 : 3 : 7

In phase two the ratio of useful : useful to some extent : not useful is 1 : 0 : 16

Although the number of participants differed between the two phases (21 in phase one and 17 in phase two) there is a noticeable difference between the two phases. The number of teachers that found the PNS useful reduced by ten. More than two times the number of teachers in phase two found the policy not useful.

I have argued that teachers were more experienced in teaching mathematics and they reflected on their enactments of the NNS. Thus they considered that they should prioritise their PCK over their policy enactments. All of the teachers who appear in this theme taught during phase one and all but three teachers were members of the SLT. I suggest a connection can be made among teachers' length of experience, their teaching position and their autonomy. My findings support Kelchtermans' (2005) argument that enactments of current policy are affected by teachers' reflections of their previous enactments.

There were contrasting perceptions of teachers' professionalism in this theme. Seven teachers lacked autonomy when they enacted the PNS despite their perceptions that their PCK was more relevant than policy based on their schools and their pupil cohorts. They became new professionals who were managed by policy, which was a negative experience. The ten autonomous teachers who adapted or ignored the PNS drew on their enactments of the NNS or their PCK. It seems that the construction of these teachers' professionalism was rooted in their experience and their confidence to prioritise their PCK over their policy enactments.

6.5 Summary of findings for phase two

The responses to phase two are different to phase one and my findings demonstrate how teachers' responses to the PNS were at times influenced by their responses to the NNS. Teachers drew on their experience and PCK and were critical in their reflections of the PNS. My summary of findings is organised thematically and I discuss how teachers' professionalism affected and was affected by their policy enactments. I focus first on the teachers' professionalism before discussing their policy enactments.

Pressure was evident when teachers perceived that the policy superseded their autonomy or when their school was in the ISP. The six teachers who featured in this theme were head teachers and members of the SLT who reflected on their time as class teachers. The sense of their loss of autonomy was evident when they constructed their understanding from their current leadership position. Their perceptions of loss strengthened as they gained experience and reflected on their previous experiences (Burr, 2015). The idea of a school's autonomy was suggested by Hasnia, Holly and Heather who lamented the loss of their school's existing practices as teachers accepted the PNS as part of their practice.

Ball, Maguire & Braun (2012: 44) argue that teachers consider their 'school's position' while deciding what action they need to take, which resonates with the idea of a school's autonomy. In terms of policy enactment my findings suggest that teachers experienced pressure when they interpreted the PNS as a policy that had to be enacted 'over and against' their current practice (Ball, Maguire and Braun, 2012: 44). Hasnia, Heather and Holly considered that the current mathematics teaching practice in their school was superseded by their perception that the PNS was 'authoritative' (Ball, Maguire and Braun, 2012: 44). These findings reinforce the negative

connotations of Perryman et al's (2011) research, where the authors argue that teachers can be directed by policy. There is also a resonance with new professionalism, which was a negative situation for these head teachers.

For the three teachers whose schools were in the ISP there was a perception that being directed by policy (i.e. new professionalism) was useful as it provided safety and consistency of practice. Danica, Taluja and Terry's translation of the PNS was that it should have been adhered to in order to raise their pupils' attainment and lead their schools out of the ISP. Their responses support Coburn's (2001) point that teachers make choices in relation to outcomes. The teachers' acceptance of the PNS abated to some extent the pressure they experienced.

The theme of professional development repeats in phase two. My findings suggest that teachers critically evaluated the PNS and considered how the policy could have benefitted their practice. Experienced teachers benefitted from the policy alongside new teachers, which challenges the idea that it is new professionals (those who are managed by policy) who develop their knowledge and skills according to what the government outlines as 'what works' (Webb et al, 2004: 90). Similarly to phase one (see section 5.2) teachers were autonomous as they recognised how the PNS could have enhanced their practice and they had the 'capacity and will' (Spillane, 1999: 144) to change their practice. In addition, teachers' critical evaluations of the PNS that led to their suggestions that the policy was helpful suggest that they made connections within their mathematical understanding, e.g. Tahreem spoke of differentiation being 'easier'.

My findings concur with Burkhauser and Lesaux's (2017) point that experienced teachers are effective at adapting policy to meet their needs. The PNS was perceived as supplementary guidance when teachers made the judgement that their PCK was more appropriate than the PCK content in the PNS. Burr (2015) refers to constructions of knowledge changing according to one's perception of the world at any given time. Thus, teachers' constructions of their autonomy in phase two were affected by their judgements of their past experiences from which they chose their trajectory (Robinson, 2012). This included teachers' perceptions of their PCK and the potential of the PNS to provide the professional development they needed.

The third theme was PCK, pedagogy and professional judgement, which also appears in phase one. Disconnection occurred for Miranda and Molly (planning), Deanna and Maisie (progression)

and Heather, Maisie and Dabria (expectations of pupils' attainment). These teachers appeared to lack autonomy as they strived to meet what Pratt (2016: 893) refers to as 'professional expectations'. Tension occurred as teachers were juxtaposed by their perception that the PNS had to be enacted. The tension reduced when six teachers ignored the PNS (Michelle, Dom, Tracey, Tina, Harry & Maisie). Ball, Maguire & Braun (2012: 95) state that teachers can take 'ownership' by developing policy into their practice. This was the case for the four teachers who adapted the policy as a result of prioritising their PCK when they combined it with the policy, which may explain why they were not critical of it.

Interestingly the group of teachers that I suggest were not autonomous included a head teacher, two deputy head teachers and three mathematics coordinators. They presented the paradox of autonomy as they perceived that they lacked the freedom to act on their professional judgements. These senior teachers could have cited their 'authority and expertise' (Helsby & McCulloch, 1996: 62) as more relevant than the policy. Instead, their responses suggest they wanted to be seen to have enacted the policy as this was expected of teachers in a senior position (Webb & Vulliamy, 2007). They became new professionals who were managed by policy (Hargreaves, 2000).

Chapter Seven - Change and challenge in phase three

7.1 Introduction

Phase three was unique as the NS ended in 2011. In addition the NC became statutory policy in 2014 and was significantly different from its predecessor. One of the aims of the NC was to provide an 'outline' of 'core knowledge' (DfE, 2013: 6) to be embellished within schools' curriculums. The term outline suggests a general description rather than a detailed explanation. In addition, the NC introduced new attainment targets that were 'deliberately ambitious' (DfE, 2013: 8).

The changes teachers experienced were significant, particularly with regard to the NC, which was perceived as lacking in guidance and challenging in content. Teachers' enactments of the NC show how the NNS and PNS were now perceived as policy guidance that had supported teachers' mathematics teaching and was no longer available.

My findings address my research questions, which are:

1. What are primary teachers' reflections on their responses to three phases of the Primary National Strategy (PNS)?

2. What are their perceptions of the effect these responses had upon their experiences of teaching mathematics?

3. How are responses similar or different between each phase and within the phases?

There are three themes in this phase, which appear in a chronological order. Prescriptive practice relates to the period following the removal of the PNS and the teachers' responses to the 2013 NC follow. The three themes are:

- Prescriptive practice
- PCK, policy and professional judgement
- Mathematics schemes

The theme prescriptive practice relates to how teachers were affected by the removal of the PNS. PCK, policy and professional judgement includes teachers' critical responses to the removal of the PNS and the NC. The final phase contains teachers' reflections of why they turned to mathematics schemes.

While the titles of two of the themes resonate with the earlier two phases the teachers' responses show how this phase was very different. Unlike phases one and two there was no accompanying training with the introduction of the NC, hence professional development does not feature. The teachers' responses dispute Kelchtermans' (2005) idea of the temporal dimension in which teachers' reflections on their previous policy enactments affect their current policy enactments. There appears to be a disconnection between teachers' previous practice that includes their enactments of the NNS and/or the PNS and how they might have drawn on these experiences.

I aim to present and discuss the teachers' responses and make comparisons to my findings for phases one and two. I continue to refer to Deanna, Heather, Michelle, Tina and Molly as policy cases. This chapter develops previous findings where the teachers' perceptions of their secure PCK led to their concerns regarding the PNS' misalignments and their practice. Teachers spoke of similar aspects of PCK (e.g. concerns regarding planning) in phase three and their responses suggest that some teachers became insecure regarding their PCK.

Phase three contains 44 teachers' responses, the largest number within the three phases (35 responses in phase one, 33 in phase two). From the 28 teachers who appear within this phase, nine taught prior to the NNS, three of whom had taught before the introduction of the first NC in 1989. All of the teachers taught while the NNS and PNS had been in situ (with the exception of Tallula who started teaching the year the PNS was introduced). My findings suggest that during phases one and two the NC had not been problematic for teachers.

The following table shows the length of time teachers had taught and whether they perceived that the policy situation or the 2013 NC was useful, not useful or useful to some extent. I suggest that there are instances where teachers' length of teaching experience affected their perceptions of their autonomy and their PCK, i.e. teachers lost confidence in their ability to teach mathematics. In addition, teachers reflected that NQTs and ECTs' lack of experience could affect their

responses to the NC. I revisit the idea that teachers' length of experience affected their responses to each phase within the conclusion.

Table 7.1: The length of time teachers had taught and their perceptions of the usefulness of the policy situation and the 2013 NC (phase three)

Length of time teaching/policy was useful, not useful or useful to some extent	Policy was useful	Policy was not useful	Policy was useful to some extent
0-5 years		**Tallula**	
6-10 years	Miranda Tara Tianna **Tina**	Dom **Tallula x 2** Taluja Tasha x 2 Tricia	Tessa Tianna
11-15 years	Michelle Tracey	Dabria Danica x 2 Harry x 2 Meena x 2 Michelle Tahreem* Terry Tracey	**Tina** Tony
16-20 years	Daisy Deanna Molly x 2	Hannah Tabitha Terry	Maisie x 2 Molly
21-25 years			
26-30 years		Holly	Holly
31-35 years	Heather x 2		
36-40 years			Tanya

The names of Tallula and Tina are in bold as they responded to the removal of the PNS at which time Tallula had five years' experience and Tina had eight years' experience. They also responded to the 2013 NC when they had eight and eleven years' experience respectively.

Teachers responded to the NC as a policy that was part of 'bigger educational discourses' (Ball, Maguire and Braun, 2012: 10) i.e. the government's perspective on what schools should teach. It was the amount of change in the NC that challenged teachers in terms of their PCK and their expectations regarding guidance. I contend that their interpretations of the NC were affected by their 'policy biographies' (Ball, Maguire and Braun, 2012: 43) which included their enactments of

the NNS and/or the PNS. On the one hand teachers were critical of the NC as they perceived that their PCK was more relevant. Yet there was the perception that the NC should have included the level of detailed guidance previously contained in the NNS and the PNS.

With the exception of Hasnia all of the teachers in my sample are included in this phase. It is interesting that a head teacher is not included. Hasnia spoke at length about her school's calculation policy and her viewpoint on cross-curricular teaching. She reflected, 'We are at the moment currently going through the changes in the new curriculum, so we are reviewing our calculation policy to fit with the new calculations in the curriculum'. Hasnia then spoke about her school's approach to what she called 'purposeful learning' but she did not reflect specifically on mathematics teaching. On reflection, I should have pursued the topic of mathematics and I concede that the omission of Hasnia is a limitation to my findings.

I focus first on the theme of prescriptive practice, which contains teachers' references to the prescriptive content of the PNS.

7.2 Prescriptive practice

In my findings for phase one I suggested that prescriptive practice related to teachers' perceptions that the NNS contained rules stating what must happen. In this phase prescriptive practice relates to the level of structure and guidance that had been provided by the PNS. This theme emerged as teachers reflected on how the removal of the PNS meant there was a lack of the prescriptive detail they were used to. I refer to this period as a policy situation in recognition that teachers were not responding to a policy.

The NS programme was a short term intervention that was removed when the government assessed that it had made a 'significant and positive' impact (DfE, 2011: 3). Teachers were affected by the change in policy and my argument in this theme relates to the connections between teachers' perceptions of their PCK and their capacity to teach.

The key findings for this theme relate to PCK and autonomy. The removal of the PNS was difficult for teachers who connected PCK with policy (i.e. they wanted to continue to combine or update their PCK with the policy's PCK content). I suggest these teachers experienced a lack of

autonomy as they could not act on their professional judgements. Conversely, teachers who were secure in their PCK disconnected from policy and were autonomous.

The teachers' responses were preceded by me asking how they felt about the PNS being archived and how the removal of the PNS impacted upon their teaching. I acknowledge that there are times when the teachers are referring to the NNS rather than the PNS. These overlaps do not affect my findings, instead they highlight how teachers reflected on the NS as the overall policy that included the NNS and the PNS. There are ten responses in this theme. Table 7.2 summarises teachers' responses that are polarised according to whether the lack of NS policy had been useful or not.

Table 7.2: Teachers' responses to the theme prescriptive practice

Name of teacher	Teachers' perceptions of the usefulness of the removal of the PNS
Danica	Not useful
Dom	Not useful
Hannah	Not useful
Harry	Not useful
Tallula	Not useful
Heather	Useful
Tara	Useful
Tianna	Useful
Tina	Useful
Tracey	Useful

Of the ten responses, five teachers reflected that they had greater choice and could draw on their PCK without the constraints of the PNS and therefore they found the policy situation useful. In contrast, five teachers attempted to continue making connections to the policy's planning (that had been moved to an archived website). For these teachers the removal of the PNS was not useful and they struggled. As these responses appear first in the table I now discuss them. The

following responses indicate that the removal of the PNS was a shock to which teachers needed to respond. Four of the responses are similar as each teacher spoke of a sense of loss following the removal of the PNS.

Hannah told me:

> I don't know, because for so many years we have been used to it being so prescriptive and now that they are saying that they are not going to be so prescriptive with what you teach, just the skills that they want taught.

There is a resonance to an earlier response from Hannah in which she referred to the NNS as useful (section 5.3). She spoke of how teachers could have achieved a balance between their teaching input and the pupils' activities. It seems that this is the level of prescription that was no longer available and had led to a loss of support, according to Hannah.

Harry recalled a sense of panic that abated when he continued with his previous practice of enacting the PNS. His response was:

> I remember the sense of panic when it was being archived and I remember the maths coordinator very much panicking and I remember my head teacher at the time instructing everybody to immediately go to the site and download everything and to keep it, so that we can still follow it, even after it's gone. So there was that kind of sense of what happens when it's gone, do we just keep following it? Do we use that to develop our own system? Do we just, it was a bit like a carry on film really, carry on regardless, there is a build up to it disappearing but nothing really changed, we just carried on using it as guidance and dipped into it but it felt that kind of strong foundation of support had gone.

Harry referred to the PNS as 'guidance' and he perceived the policy had been a tool that had developed consistent teaching approach amongst the staff. He suggested that he had been influenced by his head teacher's sense of panic, which supports Ball, Maguire & Braun's (2012) point that teachers' translation of policy can be influenced by SLT colleagues. Harry's response was to continue enacting the PNS, possibly due to the level of importance assigned to the policy

by his head teacher. His response shows a slight tension as Harry spoke of ignoring the PNS when he taught year six (see section 6.4.2).

Danica lamented the loss of the policy when she told me:

> Only because I think again when it was archived to start with and they started shutting down, we didn't have all of our new documents in and things to replace it so there was that time when you would log on and think 'oh no it's gone, I can't find anything'. We had copies of things obviously, so it was just that sort of looking, you did think at that time, it was that feeling of a bit of a no man's land for a time, you know that's gone but what is there instead? Sort of heralding in the new, not been able to get hold of the old, no it's a bit odd that they just cut it off like that but there you go.

Danica appears to have been frustrated by the change, particularly as there was no policy to 'replace' the PNS. Her sense of being 'in no man's land' shows the strength of her perception that the PNS and the NNS had been a source of guidance and support. The PNS had been useful as it helped Danica manage the pressure she experienced when her school entered into the ISP in 2006.

Dom reflected that he had only referred to the PNS for reassurance that he been 'covering everything' and otherwise he had ignored it. Within the following response he refers to his need to obtain archived planning. Dom said:

> I mean there was the state of, kind of limbo between the point where it was archived and when the new National Curriculum came out. That was a very confusing time with numeracy and literacy because you didn't really know, I mean there was nothing, so you actually had to get planning from the archived websites and things which seemed bizarre.

It is possible that the removal of the PNS prompted Dom to realise that while he had ignored the policy to an extent being able to refer to it had been supportive.

Tallula's concern relates to her delivering her teaching at the appropriate level. She said:

> And then it was all archived, so we can still find bits, but I found that first year, I really struggled to make sure it was appropriate content for where the children were actually at.

Tallula considered the PNS useful as it enhanced her practice by providing 'teaching ideas'. Following its removal Tallula maintained her perception that the policy had been reassuring in respect of pitching her teaching appropriately.

A policy cannot pre-empt teachers' different requirements in terms of potential enhancements to their PCK. It is possible that within their own mathematics learning these teachers experienced what Askew (1997) refers to as a transmission approach that limited their capacity to make professional judgements. There was no longer a policy that teachers could make a connection with therefore they were unable to combine or update their PCK. These teachers struggled in their mathematics teaching.

These five teachers were not autonomous as they could not make judgements even though the lack of policy meant they were free to act. The teachers' attempts to access the archived PNS clearly indicate how they had been managed by policy (Hargreaves, 2000, Evans, 2008). They had however benefitted from being new professionals as policy had been a source of guidance and security. The teachers' responses show how political actions affect teachers' day to day activity whereas the government's decision to remove the policy was based on an assessment of the NS. This is an underlying tension that I develop within this chapter.

Turning to the five responses where the removal of the PNS was useful, teachers spoke generally about making judgements rather than reflect upon a specific PCK topic. Heather appears to have welcomed the chance to take ownership of the mathematics teaching in her school. In phase two Heather said that she changed her school's system in order to do as the government wanted. Her response to phase three suggests a sense of release from the requirement to enact policy:

> I do think now that we have been able to take materials that we have wanted to and approaches that we have wanted to take and so long as we are teaching the children what they need to learn and making sure they get a good grounding in maths, I feel that now how we do it is more up to us and what we

> use to do it is more up to us. I think that is right really because we know what the end product must be, we know where we must get the children, we know what they must know by the end of each stage in their life, but how we get them there I think now is more up to us.

I suggest that Heather's response shows the culmination of her views on autonomy as she once again refers to wanting her school to be autonomous. Heather's previous responses suggested that teachers should be secure in their PCK, have a consistent approach to teaching, be autonomous and therefore not be pressured to enact policy. The removal of the PNS meant that there was a lack of prescriptive policy and Heather and her teachers could create a school calculation policy that outlined how pupils were taught mathematics. Heather suggests that all of the teachers in her school were secure in their PCK. However, her final response (which is in section 7.4) shows that she went on to purchase a mathematics scheme. However, the need to provide a means of PCK suggests that Heather wanted a consistent approach in terms of the models and strategies teachers used within their mathematics lessons.

Tara referred to using her 'professional judgement' when she said:

> Because there's not a definite this has to be taught in this number of weeks or this number of days, I find that a lot easier, that we can just do that ourselves, we can manage that and judge that from our own professional judgement.

It seems that these two teachers were liberated by the removal of the PNS and they gained autonomy to act in accordance with their professional judgements. In addition they no longer experienced what Berry (2012) and Robinson (2012) refer to as the paradox of autonomy where teachers' freedom is constrained by pressure to enact policy despite their dissatisfaction.

Tianna reflected that she could now utilise a range of teaching methods. Her response was:

> As a teacher at that time, I probably felt that I had to teach in that particular way and I didn't necessarily, I don't think I really had the experience I have now to know how to teach it in a different way necessarily, or how a child might understand, as well as I do now. I have lots of ways of teaching the same thing in different ways and one of them will work. So anything now

> you've got more experience to draw on, and you have, it's less rigid so it's kind of an ideal situation really.

It is not surprising that Tianna considered phase three as 'ideal'. In phase one she spoke of a lack of autonomy when she adopted the school's response to the NNS. She had not remembered the PNS and I suggest that phase two was a time where Tianna developed her own approach to mathematics teaching.

It is interesting that Tina spoke of freedom in phase three when she said:

> I feel that there is quite a lot of freedom, you know what you have to teach and it's up to you how to deliver that. I suppose you have to take into account the cohort, the type of children you have and what they would have been exposed to before in the school and obviously we take into account guidance and the ethos that the children come up with, in terms of how we teach. We do have some guidance as to how to do it... in-house guidelines. This is what you do for mental starters, possible suggestions, but I just feel that as long as I am covering the Curriculum everything else is up to me.

Tina had been in survival mode at the outset of phase two when she enacted the West End mathematics scheme alongside her colleagues (see section 6.4.2). She had no choice or time to collaborate with her colleagues or make a professional judgement regarding her enactment of the PNS or the selection of a scheme. Thus, Tina's sense of freedom expressed in this response contrasts starkly with her previous experience. The removal of the PNS seemed to reverse the constraints that Tina had experienced. She considered that her professional judgement was relevant for her mathematics teaching and her point that it 'is up to me' suggests that she was free to act accordingly, due to her secure PCK.

During phase two Tracey ignored the PNS and continued to enact the NNS (as discussed in section 5.3). She told me:

> I just use my common sense and say, "Right well you haven't got that so we're going to carry on and consolidate knowledge then we can move on," so I think we have to be flexible. To a certain extent it's good that you do, you know

> what you have to teach, there you go, you know what you have to teach and then you kind of just use your common sense, you might spend more on that and less time on that.

These five teachers interpreted the policy situation by making sense of what the removal of the PNS meant to their practice. Their reconstruction of policy was affected by their 'professional dispositions' as they decided how to update their practice (Ball, Maguire and Braun, 2012: 111). Tara, Tianna, Tina and Tracey taught with the NNS and the PNS and Heather taught prior to the introduction of the NS policies. These teachers clearly had a sense of freedom which coupled with their PCK led to a disconnection from policy and a strong sense of autonomy. Their 'authority and expertise' (Helsby & McCulloch, 1996: 62) was restored and they were not bound by any constraints.

To summarise, the lack of a prescriptive policy led to the binary classification of teachers' responses in terms of their autonomy and their interpretations of the policy situation. In chapter two I outlined how changes in government or political pressures to improve education led to changes in policy, e.g. the NS and the 2013 NC. The responses to this theme of prescriptive practice show how teachers were affected by these political actions. Autonomous teachers found phase three useful as they drew on their secure PCK and made 'discretionary judgements' (Hargreaves & Goodson, 1996: 20). The five teachers who interpreted the policy situation as a time of uncertainty lost sight of their retrospective policy enactments and they experienced struggles. The attitudinal development (Evans, 2008) experienced when they were trained with the NNS and/or PNS became functional (i.e. in response to policy). Tension existed when teachers became insecure in terms of their PCK, despite their experience, when the policies were no longer in situ.

I now turn my attention to the teachers' responses to the NC.

7.3 PCK, policy and professional judgement

This theme emerged as teachers reflected on the NC that was introduced in 2013 and become statutory in September 2014. My findings show that the NC was perceived as the source of significant change for 22 teachers and this theme had the greatest number of responses within

this thesis (26). Two sub-themes pertain to teachers' concerns and difficulties in enacting the NC. The sub-themes are:

- Lack of guidance
- The increased level of challenge in the NC

Within table 7.3 I summarise the teachers' responses in terms of whether they found the NC useful, useful to some extent or not useful. I had difficulty in categorising two responses in terms of the usefulness of the NC and I discuss Tianna and Tina's responses in depth to demonstrate my difficulties in section 7.3.2.

Table 7.3: Teachers' responses regarding the theme PCK, policy and professional judgement

Name of teacher	Teachers' perceptions of the usefulness of the NC
Lack of guidance	
Holly	Useful to some extent
Tanya	Useful to some extent
Tessa	Useful to some extent
Tony	Useful to some extent
Molly	Not useful
Dabria	Not useful
Danica	Not useful
Meena	Not useful
Tabitha	Not useful
Tahreem*	Not useful
Tallula	Not useful
Taluja	Not useful
Tasha	Not useful
Terry	Not useful

Tracey	Not useful
Tricia	Not useful
Deanna	Useful
The increased level of challenge in the NC	
Tianna	Useful to some extent
Tina	Useful to some extent
Harry	Not useful
Holly	Not useful
Meena	Not useful
Michelle	Not useful
Tallula	Not useful
Tasha	Not useful
Molly	Useful

Two thirds of the teachers' responses (17 of the 26) suggest that the NC was not useful due to their professional judgements of its PCK. For two teachers the NC was useful as it contained an increased level of challenge. When teachers spoke of concerns alongside positive references to the NC the policy was useful to some extent for six teachers and not useful for one teacher.

I extend the ratios to signpost the number of teachers who found policy useful, useful to some extent or not useful to phase three. These responses show how the teachers' critical reflections continue from phase two to phase three.

In phase one the ratio of useful : useful to some extent : not useful is 11 : 3 : 7

In phase two the ratio of useful : useful to some extent : not useful is 1 : 0 : 16

In phase three the ratio of useful : useful to some extent : not useful is 2 : 6 : 18

The ratios show that a greater number of teachers found phase one the most useful. In phases two and three a greater number of teachers had not found policy (the PNS and the NC) useful.

I present the effect of phase three in terms of teachers' PCK in table 7.4, which shows that disconnections occurred to a greater extent than connections. The PCK topics are sorted according to where teachers perceived that they did not have the knowledge required to teach the NC. They sought guidance, i.e. there was a need to make a connection to policy. The second column shows the topics in which teachers considered their PCK was more relevant than the NC, i.e. there was a disconnection from policy. Planning and progression appear in both columns, possibly as these topics underpin teachers' interpretations of the NC. Long term and short term planning entails teachers having an understanding of how to bring about pupils' learning as well as sequencing learning events to ensure progression (Shulman, 1986, Ball, Thames & Phelps, 2008). Teachers reflected that their PCK was secure and more relevant, Harry and Meena spoke of the need to precede formal calculations with informal, expanded methods in order to facilitate pupils' understanding of algorithms. In contrast, teachers sought a connection, e.g. Tahreem cited the difficulty in teaching the grid method for multiplication without previously using a number line.

Table 7.4: The effect of phase three on teachers' PCK

PCK topics in which teachers were insecure (sought a connection)	Topics in which teachers considered their PCK was more relevant than the NC (disconnections)
Assessment Planning Progression	Expectations of pupils' attainment National tests Planning Progression

The first sub-theme is lack of guidance that signals that there were implications when the NC was introduced as it was a significant policy change. Teachers had been managing following the removal of the NS (that had provided a great amount of PCK and professional development). While the Coalition government aimed to reduce curriculum content and provide schools with autonomy the government's aim did not appear to have been realised in the following responses that were made very soon after the introduction of the NC.

7.3.1 Lack of guidance

This sub-theme emerged as teachers reflected on the NC as a statutory document, which Ball, Maguire and Braun (2012) argue affects teachers' interpretations of policy. However they paused in their interpretations when the teachers found the NC lacking in the detail they needed to put the policy into action. They sought a connection to policy (or a form of guidance). I refer to teachers reaching an impasse as they transitioned to teaching the NC. They experienced tension and they were unable to move forward from the situation they were in.

Of the 17 responses that appear in this sub-theme, four teachers found the NC useful to some extent, 11 did not find it useful and one found it useful. Three teachers reflected on their own enactments alongside their considerations of how NQTs and early career teachers (ECTs) might respond. These teachers found the NC useful to some extent. Molly's response includes a point that the NC benefitted creative teachers as well as a consideration that some teachers would need guidance. I suggest this teacher (Tony) also considered the NC useful to some extent. The final response comes from Molly who did not consider the NC useful. She reflected in terms of NQTs needing support while also considering the support available.

I start with the responses where teachers found the NC useful to some extent. Holly and Tanya taught prior to the first NC (introduced in 1989) and drew on their experiences. Holly said:

> I think that what we've been left with now, if you are coming in as a new teacher with the new National Curriculum it really is the bare bones that they've given you. It doesn't allow for explaining what the terminology is in any practical terms as in a teaching tool for them to use. Having a new skeleton National Curriculum for me is not a problem because you look at them statements and you can work with them and I think the biggest problem is teachers new to teaching who haven't got that background and that knowledge, that is being developed, are finding it very difficult to just taking those statements that they've been given and be able to say, "Okay so how am I going to implement that statement into a teaching lesson?"

Holly's response suggests that the NC could have been problematic for NQTs and ECTs to teach. The skeletal metaphor highlights the lack of guidance available and she suggested the need for

supplementary guidance that had previously been provided by the NNS and PNS. Potentially, the teaching of mathematics in Holly's school could have been negatively affected, which supports Scott's (2000: 5) claim that a new Curriculum could evoke 'disruption to the coherence of what it replaced'.

Tanya spoke of being able to make professional judgements regarding adapting the NC when she told me:

> I think we have much more autonomy now, which is ok for more experienced people, but NQTs and less experienced teachers will need more structure. Perhaps they need to see where they're going. Whereas as I said previously we do tend to think if we need to miss steps or jump ahead we do think we can do that.

Tessa's response resonates with Holly and Tanya with regard to the differences in PCK between NQTs and experienced teachers. Her response was:

> I am an experienced teacher so I can pick out what I can, understand what's needed and use my prior knowledge from the unit plans that they had originally, to the PNS, to my professional judgement. But I think, like I said brand-new teachers coming in and given that this is what year four have to cover, for example, I think it's very vague and very sparse and not enough detail in terms of what you actually have to teach and how to teach it.

In phase one Tessa made a similar point regarding the need for teachers to be consistent when she referred to the NNS' vocabulary book as the 'law' for consistent practice.

Tony referred to teachers' creativity rather than their experience. He told me:

> It needs some sort of structure, but I also, at the same time think it needs to give teachers the opportunity to be creative and be individuals. As I felt with the strategies, they were trying this and it was quite narrow and those teachers that were creative and wanted to adapt had quite limited opportunities. But with the new Curriculum I feel it's given back to those creative teachers

> ownership of the Curriculum, although I do believe there needs to be some sort of structure and guidance.

Tony suggested that 'structure and guidance' would have benefitted non-creative teachers. It seems that Tony associated creativity with teachers' experience of teaching mathematics. Interestingly, he perceived the NC was useful to some extent because of its lack of guidance, which meant that experienced, autonomous teachers could make judgements regarding how it was taught. In contrast, Tony suggested that inexperienced teachers lacked autonomy which concurs with his earlier reflection of adhering to the PNS before becoming 'more confident' in his professional judgements and adapting the policy.

Tony perceived that the NC released teachers from the restraints of the NS policies where policy had narrowed 'the range of creative responses' (Ball, Maguire and Braun, 2012: 3). NQTs and ECTs were considered as new professionals whose PCK needed to be provided by policy guidance, which echoes the responses of Holly, Tanya and Tessa.

Holly, Tanya, Tessa, Tony and Molly appear to have been able to enact the NC despite its lack of guidance. Their responses support Webb and Vulliamy's (2007) argument that policy enactments lead to an improved practice as they appeared to draw on their PCK that had developed over the previous two phases. Their knowledge emerged and changed into a cumulative repertoire and their interpretations of the NC would have been influenced by their experiences, according to Burr (2015).

These five teachers show consideration for NQTs and ECTs who would enact the NC while focussing on surviving their early years of teaching (Maguire, Braun & Ball, 2015). Their responses dispute Shulman's (1986) point that teachers should know how to bring about learning using appropriate methods in order to progress pupils' understanding, i.e. curricular knowledge. New teachers however would have limited 'policy biographies' (Ball, Maguire and Braun, 2012: 43) which would negatively affect their making sense (interpretation) of the NC.

Two teachers appear to have been autonomous as they referred to their professional judgements, e.g. Tanya could decide how to adapt the NC and Tony spoke of being creative. Holly, Molly and Tessa referred to NQTs and ECTs' limited autonomy, which would reduce their capacity to make

professional judgements. For example, Holly said that new teachers lack the PCK regarding implementing the NC's learning objectives into mathematics lessons. Therefore, teachers' autonomy is rooted in their experience, which affects their capacity to make professional judgements. The NQTs and ECTs' lack of experience equates to their limited autonomy, which makes them new professionals, however there is no additional policy to manage their enactment of the NC, i.e. their daily mathematics teaching. As there is no choice but to enact the NC its lack of guidance is problematic for new teachers.

I now turn my attention to responses alluding to the NC not being useful. Thirteen teachers perceived that there was a lack of guidance. Their responses indicate that they were used to connecting with policy to combine or update their PCK, which was no longer available. Teachers became uncertain of how to disseminate the NC into yearly and termly plans and they struggled to teach the NC's learning objectives in their daily mathematics lessons. The implications of the difficult transition to the NC include teachers' loss of confidence, needing to spend time researching and planning their lessons and inconsistent teaching, i.e. omission of learning objectives. These teachers sought a connection to policy for guidance to address their perceived insecure PCK. The teachers' responses are presented in accordance with the PCK topic to which they referred.

I discuss Molly first as similarly to the four teachers above (Holly, Tanya, Tessa and Tony) she considered NQTs. However she suggested the NC was not useful:

> I think, left to their own devices, it would be quite hard, but most schools have got or are using some form of medium-term plans of which to draw for their short-term plans and that is always very supportive. But I think NQTs are certainly going to need the network of their colleagues or something like that.

Molly's response resonates with her previous concern that planning to meet the aims of policy can be difficult. In phase two Molly appeared to consider herself and her colleagues when she spoke of having difficulty in planning from the PNS. In her response to phase three she seems to have reflected as the mathematics coordinator who was responsible for supporting colleagues as they enacted the NC. She recognised that NQTs would need additional guidance possibly as Molly recalled finding the NNS useful in terms of PCK when she was an ECT. It seems that Molly did

not see herself as a source of support (as I suggested was the case in phase two). Instead her response suggests that as the NC was new all teachers were in the process of interpreting the policy and gaining an understanding of what it meant to their practice. Hence, colleagues could collaborate and make sense of the accompanying planning, which could be supportive at this early stage (Spillane, 1999, Coburn, 2001, Robinson, 2012).

Dabria and Taluja's responses refer to concerns of inconsistent interpretations of the NC. Dabria focussed on the NC's format that separated learning objectives into statutory and non-statutory sections. The NC states, 'Schools are not required by law to teach the example content in [square brackets] or the content indicated as being 'non-statutory' (DfE, 2013: 12). The non-statutory content is provided to exemplify how the statutory objectives might be attained (DfE, 2013). Dabria's response was:

> I find that it is quite confusing, we had to interpret it a lot ourselves. There are quite long statements within the statutory guidance and non-statutory parts. Statutory parts I don't think it's particularly clear and I think, especially as a new teacher, I think it's quite difficult to interpret that just themselves and make sure that there is that breadth of what is being covered.

Taluja told me:

> It seems to be open to your interpretation and actually to me, I find that quite concerning and I'm sure as an NQT I would be quite worried about that, because the way one person reads something is one million times different to the way that somebody else will read it. So I would worry about the consistency of the teaching I guess and I think for our school it is important for us to get a whole school approach and actually not leave it to individual people to interpret.

Dabria and Taluja suggested that NQTs and ECTs along with experienced teachers would have reconstructed the NC in different ways in accordance with their PCK. The resultant teaching could negatively affect pupils if they had to unlearn concepts in order to learn different methods.

The new methods may not be understood or pupils may consider their way is better and they could potentially be overwhelmed.

Dabria and Taluja's responses suggest that additional guidance could steer their interpretations. Staff meetings could provide helpful, specific guidance, e.g connecting the non-statutory and statutory guidance. Collaborating with peers enables teachers to share ideas and develop their responses to policy (Wideen, Mayer-Smith & Moon, 1996). The result of this collaborative sensemaking (Coburn, 2001) would be teachers' translation of policy with a more consistent understanding of how to put the NC into practice.

The attainment system changed with the NC, yet the 'exact methodology' of assessing pupils' progress with benchmarks to compare higher or lower attainment was 'still to be determined' (DfE, 2014). Teachers were expected to 'determine how best to assess their pupils' (DfE, 2014: 3). Danica and Tabitha spoke about the lack of guidance for assessing pupils' attainment, which seems to have reduced their confidence. Danica's response was:

> I think the biggest issue at the moment is this whole assessment without levels because I think it's left a lot of schools, certainly local to this one, feeling like we don't really know what's happening.

Danica spoke of other schools, which suggests she had discussed assessment with her peers. Unfortunately, this collaboration reinforced her uncertainty of knowing what to do.

Tabitha was teaching year six at the time of her interview. She reflected on her need for guidance in the form of examples and resources when she said:

> We need to see and know how it's going to be tested. You need to see what's expected of the children. I think you need quite a range of things. I think policy is one thing but I think we need everything to go with it, the papers that they are going to be using, the types of questions, examples, general resources because that was another issue. How do we find a level six resource?

According to Shulman (1986) PCK is needed for teachers to disseminate their mathematics knowledge into teaching methods using models and explaining concepts. It appears that resources were important for Tabitha's development of her PCK and she would be able to make connections between the resources and her teaching. Her response echoes how resources provided supplementary guidance to Tabitha in phase two. Tabitha's response to the NC may have been strengthened by having previously experienced the opportunity to make connections to policy and her perception of the subsequent lack of resources in phase three.

Danica had been teaching for 15 years and Tabitha had been teaching for 19 years when the NC was introduced, therefore both teachers had an extensive PCK based on their usage of assessment procedures. Danica and Tabitha's responses suggest that they lost their confidence when policy changed in a significant way. They were free to act although they appeared uncertain due to the disconnection between their experiences and the lack of an assessment framework.

Danica and Tabitha's interpretation of policy raised questions that led them to an impasse. While uncertainty could lead to teachers ignoring policy (Ball, Maguire and Braun, 2012) these two teachers were unable to ignore the requirement of assessing their pupils. Their policy enactments paused at this point yet it is most likely that they would have spent time researching assessment.

Meena, Tallula and Tricia compared the amount of detail within the NC to the previous NNS and PNS. Their responses focus on potential inconsistencies of planning and teaching the NC.

Meena said:

> I am worried that the way it was organised, as much as I leant on the NNS because I still had those documents, there was each block that had suggested links and things like that, some suggestions of methods used and now it feels like that's been stripped and I feel that teachers that I am observing are picking up an objective, probably going on the Internet to look up something, but it isn't necessarily the methods or the strategies I want them to apply.

Meena spoke of her continued reference to the NNS. She suggested that without the consistency of the NNS/PNS guidance, teachers would draw on their PCK to determine how they taught the NC's learning objectives. It is interesting that she was concerned that teachers would not draw on their previous experience and/or the NNS that could have been useful.

Meena was aware of her responsibility for how mathematics was taught in her school. She went on to say that she needed to update her school's calculation policy to provide a 'reference document to tell them it should look like this'. It is evident that she saw how pupils might have been negatively affected through teachers' inconsistent approach to mathematics teaching.

Tallula reflected on her need for guidance to teach the year six learning objectives. Her response was:

> I always felt like they assumed that you would know how to deliver a lesson based on that objective and I think that is quite hard to think 'how do I?' It's different for me now I can look at some objectives and think, 'okay I will teach it this way', but even some of the year six Curriculum we have been throwing some comments around and I think, 'I have never taught this, I don't know the teaching steps'. I can always think of an activity but I don't know the teaching steps so a colleague guides me, because there is no guidance now.

Tallula is the least experienced teacher in my sample, which may explain her perception that she did not know how to teach. The PNS had been useful as it provided 'teaching steps'. Tallula's PCK may have been enhanced by her colleague's guidance. However there is a possibility for inconsistent teaching should Tallula's colleague pass on insufficient detail or if Tallula misinterprets the guidance.

Tricia's response also shows the need for teaching steps. She said:

> So they are saying the kids need to know more, but they're not telling you how they are going to, it's like saying they need to know quadratic equations, teach them that and you think okay how? Suddenly they have to learn a lot more, a lot quicker and it's not very well supported I don't think.

The changes to the NC, particularly in year six, where there are many new learning objectives to be taught led to Tallula and Tricia's perception that they lacked the PCK and needed guidance. It seems that the extent of the changes to the NC exceeded their capacity to teach year six. Both teachers referred to assumptions of the NC writers that teachers' PCK was sufficient to 'transform' the new learning objectives into lessons (Shulman, 1986: 8).

The interpretation of the NC led to the disconnection between Meena, Tallula and Tricia's 'policy biographies' (Ball, Maguire and Braun, 2012: 43), their previous teaching experiences and their sensemaking of the NC. They clearly show how teachers could use their own teaching approaches that may have led to inconsistent practice. An impasse was reached as the teachers suggested 'radical' change was needed (Ball, Maguire and Braun, 2012: 10) at a time where they had not yet translated the policy into their practice.

A further implication of the NC's lack of guidance is the potential for pupils to have gaps in their knowledge. Tasha's response was:

> There are some year groups where it doesn't seem to touch, so for my group we are working on shape and we are doing this in year one and two and then there is nothing in year three, but by year four they are expected to do this and you think 'well hang on a minute, how are they meant to go from this to this?' And we as a school are trying to fill in those gaps.

Tahreem's concern was the removal of the number line as a method of multiplication. She told me:

> We had a very big problem, for example the first thing was grid multiplication in year three. In the past with the PNS we would do multiplication on the number line to show so many lots of the number, and then all of a sudden in the autumn term we are doing the grid method. You have to do grid method and that used to be summer (of year three), we worked up to that with them understanding what multiplication means. Multiplication means lots of and because that's been taken away they really struggled because it had assumed that they had done the number line in year two which they haven't done.

It is interesting that Tahreem anticipated that her pupils would find multiplication difficult yet she had not considered drawing on her PCK to include the number line. Her response highlights that Tahreem made a professional judgement but perceived that she was unable to take action.

Schools can decide when learning objectives are taught so long as the NC's content is covered (DfE, 2013). Previously, the PNS guidance stated the distribution of the NC's learning objectives across the year groups. It seems that teachers' concerns relate to their perceived capacity to, for example, 'fill in those gaps' or alleviate pupils' struggles (Tahreem). They appear to suggest that this guidance should be included in the NC.

I introduced mathematics mastery in chapter two and briefly discussed how it was introduced alongside the NC as part of government policy. Mathematics mastery, rooted in Pacific Rim countries such as Singapore and Shanghai involves teachers teaching fewer concepts (than the English NC) in greater detail, i.e. with depth and breadth (NCETM, 2014). The term mastery does not appear in the NC, neither do the terms depth and breadth and the following two teachers had difficulty in interpreting how their practice needed to change.

Terry and Tracey were unclear, which led both teachers to question their practice and they were unable to make professional judgements.

Terry told me:

> Each term, well at first glance, well it looks great, but when you look more closely the same objectives are just repeated with new ones introduced every so often and we've been told, "Oh you have to look at depth", it's either depth or breadth or breadth or depth or something like that and I'm drawing on my skills of being a teacher for nearly 20 years and thinking, well am I really building on this objective in these terms? It's assuming that there is, there's a whole range of teachers, a whole range of experience, so is everybody, how do we know if there is consistency across the year group and we are all building on the objectives? Who knows?

Terry was unclear about how to teach 'repeated' objectives that facilitated pupils' progress. He seems to have lost confidence, which also occurred when he was under pressure due to his

school being in the ISP in phase two. Interestingly Terry refers again to a lack of confidence when he reflects upon purchasing a mathematics scheme in secret. This response can be found in section 7.4.

Tracey made a similar point regarding depth and breadth when she said:

> There doesn't seem to be any ideas out there in terms of, people just keep saying to me, “it’s depth not breadth” and I'm thinking, ‘well could you show me?’ For example, how I can move from that objective which is exactly the same as that objective, for example too, and make it more depth, so give me some ideas, sort of thing. So they've kind of gone from one extreme to the other, whereas you know the PNS was too much and then this one is so wishy washy in that you are teaching numbers to 1,000,000 and thinking, ‘okay here we are’, I find it terrible actually.

Within her response to phase two Tracey reflected that she ignored the PNS as she perceived that her continued enactment of the NNS was sufficient for her mathematics teaching. The NC brought about significant change that was too much for Tracey to interpret.

Shulman (1986) refers to PCK in terms of teachers using effective materials and methods to bring about learning. I suggest that Terry and Tracey were secure in their PCK but they lost their confidence when they were unfamiliar with the terms depth and breadth. Thus there was a connection between their PCK and their confidence.

The responses demonstrate how teachers experienced tension as they enacted the NC. They struggled to make sense of how the NC would be interpreted and assessed. In addition teachers struggled with the lack of accompanying guidance, e.g. the teaching methods and teaching with depth and breadth. Tension occurred as teachers had to teach the NC despite being at an impasse.

The final response comes from Deanna who suggests that the NC is useful as it contains an appropriate amount of guidance. Deanna told me:

> I think the new Curriculum is quite useful because it actually, really tells you what has to be learnt in a year group and so I think that is quite useful, because I think like the literacy strategy, you can go back and tick off what you have taught that term. Be sure that you are where you should be. So I think it has to be specific in the coverage but not perhaps down to a lesson and how you teach it.

Deanna found the NC useful in terms of providing programmes of study to be taught. The autonomy that was evident in her responses to phases one and two is again apparent. Deanna appears to appreciate the opportunity to plan in accordance with the pupils' learning and attainment needs. In addition her PCK is secure and therefore she can teach the NC despite its lack of guidance. She also suggests that the reduced amount of guidance would develop teachers' sense of autonomy and they would move away from being managed by policy. Deanna's response suggests that her colleagues are able to teach the NC without policy guidance, which contrasts to her earlier responses where she referred to teachers' insecure PCK. This recurrence of Deanna's assumption that teachers are secure in their PCK first appeared in phase one. Deanna threw away the NNS and asked teachers to plan and teach without policy guidance. She also reflected critically on the pace of progression in the PNS. She appears to value teachers' PCK over their enactments of policy and wants teachers to be autonomous, which appears to explain her assumption that their PCK is secure.

In sum, lack of guidance suggests that teachers looked for guidance (sought a connection to policy) rather than draw on PCK that they perceived may not have been secure. The responses from Holly, Tanya, Tessa, Tony and Molly show how teachers' experience affected their autonomy, e.g. Tanya said that she would adapt the NC. NQTs and ECTs were considered as lacking autonomy as they did not yet have the experience to make professional judgements. Therefore new teachers are juxtaposed between being new professionals and lacking the additional policy to manage their practice.

Experienced teachers became insecure about their PCK and perceived that they did not know how to teach the NC. Dabria, Danica, Meena, Tabitha, Tahreem, Tallula, Taluja, Tasha, Terry, Tracey and Tricia seemed to lack autonomy as they made professional judgements of the NC yet

they perceived that they did not have the freedom to act. As Ball, Maguire and Braun (2012) argue it is difficult for teachers to resist enactment of non-statutory policy.

The teachers' responses suggest that they had been shaped by their previous policy enactments where they had made connections to policy. The term connection takes on a different meaning in this context. Rather than combine or update their PCK with/from policy the teachers' responses suggest that their PCK was rooted in policy. Therefore they sought a connection. These teachers became insecure about their PCK, possibly as they had been shaped by their previous policy enactments. Their responses challenge Ball, Maguire & Braun's (2012: 43) idea that 'policy biographies' affect teachers' enactments of policy as they appear to have paused in their interpretations. Burr's (2015) theory that previous experiences inform people's understanding is also disputed by this disconnection.

Teachers experienced uncertainty and lost their confidence, which contributed to tension in their policy enactments. They found themselves needing to spend time researching their assessment (Danica) and their planning and teaching (Tabitha, Terry, Tracey). Pupils' learning could be negatively affected (Dabria & Taluja, Tasha & Tahreem), and there may have been inconsistencies in teachers' planning (Meena, Tallula & Tricia). The exception to these findings came from Deanna who appeared to welcome the opportunity of teachers becoming autonomous when they were no longer being managed by policy.

School autonomy becomes relevant as teachers who engage in 'collective sensemaking' (Coburn, 2001: 151) and collaboration with colleagues can discuss and clarify their responses (Wideen, Mayer-Smith & Moon, 1996) especially with a significant policy such as the NC. Deanna's response shows that she wanted teachers to be autonomous so that they could apply their PCK and make professional judgements when there are changes to policy. Interestingly, Deanna was the only teacher to suggest this, which was in sharp contrast to the other 11 responses where teachers spoke of a lack of autonomy.

I now turn my attention to the teachers' responses regarding the level of challenge in the NC.

7.3.2 The increased level of challenge in the NC

There is a similarity between the following responses and teachers' perceptions of their PCK within phases one and two. For example, Deanna and Maisie spoke about the misalignment between the PNS and their practice regarding the policy's pace of progression. These concerns are considered within the following discussion and I demonstrate how teachers are more critical in their responses to the NC.

Nine teachers reflected upon the increased level of challenge within the NC (see table 7.3 for a summary). They spoke of concerns regarding how their pupils would make the transition from their previous learning to be able to engage with learning objectives in which they had limited or no prior understanding. When six teachers spoke of an expectation to teach and/or they were concerned regarding pupils' lack of previous learning the NC had not been useful. In contrast, three teachers reflected on how the higher attainment expectations provided an achievable challenge. The NC was useful for Molly. Tianna and Tina suggest the NC had been useful to some extent.

Molly, Tianna and Tina appear to have been secure in their PCK and seemed confident to teach the NC. There was no need for policy as teachers perceived that they were secure in their PCK.

I start with Molly's response. She told me:

> I suppose I'm using the new National Curriculum with all the knowledge that I have from the previous strategies, it's all so much there although the new Curriculum obviously raises the bar significantly, but having taught year six and level six it's not raised the bar beyond anything that I have already done.

There is a change in Molly's response as she reflected on her own PCK rather than in consideration of others (see sections 6.4.1 and 7.3.1). In phase one Molly's confidence was evident as she reflected on the NNS only in terms of finding its guidance useful and she was autonomous. Similarly she selectively enacted the PNS according to where she perceived the policy enhanced her practice, through making sense of 'resources and other documents'. These earlier references to her secure PCK are reinforced by Molly's confidence to teach the more demanding NC despite its lack of guidance. She may have been relieved that there was no

planning structure that had caused her to struggle in phase two. Also, Molly maintained her autonomy as she made a professional judgement to draw on the PCK she gained from the NS policies.

Tianna and Tina perceived that the NC was useful to some extent. Tianna's response was that she was 'excited' although she also said that expectations of pupils' attainment changed regularly. She said:

> I'm quite excited by it actually, I really like the new Curriculum. I think it's more challenging in some ways and I think that's the way, it's achievable challenge. I think the goalposts are always moving and I think that there are some parts of it that the children are ready to grasp. Hopefully it will be okay but we will see.

Tianna's reflection that the NC provided 'achievable challenge' suggests that the pupils were ready to face a higher level of challenge. She seems to have been secure in her PCK, which resonates with her knowing a range of ways to teach acquired through her enactment of the PNS (see section 7.2). While she was confident about her capacity to teach the NC, Tianna expressed doubt when she said 'hopefully it will be ok'.

Tina mentioned that the NC contained a higher level of challenge but she did not consider the changes 'major'. Her response was:

> Personally I don't feel that the changes are major. There is an obvious shift in difficulty, so it has gone up at least a sublevel, if not more, it almost feels like your level four learning is going to be level five.

Tina suggests that the NC was useful to some extent. It becomes apparent that Tina referred to the removal of the PNS as a time of 'freedom' as she had not had the opportunity to draw on her PCK, which appears to be secure. It seems that she accepted the NC because of its increased level of challenge and I suggest that phase three was seen by Tina as a time where she was most confident and autonomous.

Tianna and Tina's responses suggest that they were not entirely certain of the outcome of their enactments at the time they spoke to me. Thus, they made prospective interpretations of the policy based on the assessments of their pupils and their perceptions of how they might manage the change. Their professional judgements were underpinned by what Shulman (1986) refers to as curricular knowledge, the appropriateness of the content along with knowledge of the relevant ways to facilitate pupils' access and engagement.

Molly, Tianna and Tina made a 'retrospective and prospective' decoding of the policy (Ball, Maguire and Braun, 2012:43) and inferred that they could draw on their PCK. Their responses suggest that they recognised the constituent concepts that needed to be taught and also knew which models etc. to use, which Brown & McNamara (2011: 46) refer to as the 'repackaging of mathematics'. The NC was useful or useful to an extent and its increased level of challenge aligned with their secure PCK. Hence there was no need for policy guidance. They appear to have been autonomous in terms of their perceptions that they could act in accordance with their professional judgements.

The following six responses show that teachers were concerned about not having a choice in terms of the order and content of the NC's learning objectives. The teachers' responses suggest that there was a disconnection from policy as their PCK is secure and more relevant than the NC in terms of their curricula knowledge, i.e. an awareness of age appropriate learning objectives and progression of concepts (Shulman, 1986). They are critical of what appear to be misalignments between their curricular knowledge and the NC. Their responses lead me to argue that the teachers' professional judgements were superseded by their perceptions that they had to enact the NC. The effects of this were reduced autonomy for teachers and potential negative implications for their pupils' learning.

Harry and Meena spoke about algorithms that were not preceded by the underpinning concepts of expanded calculations. Harry spoke of being 'forced' to move pupils on when he said:

> We're being forced into teaching formal methods of calculation and moving away from using the method or strategy that is most applicable, or the one that you find is the most useful one for you.

Harry suggested that he could have drawn on his PCK to select 'applicable' methods to underpin pupils' understanding. For example the use of the grid method of multiplication where numbers are partitioned into their place value parts (Haylock & Manning, 2019).

Meena told me:

> Calculations in key stage two, you need to move on to formal methods, it does mean pressure is on, particularly in year three to make sure that they are ready to move on to formal methods and I worry that some teachers will quite comfortably move on to the formal methods, but that doesn't mean the understanding is embedded.

While Meena's concern resonates with Harry's in terms of the negative effect on pupils learning she also considers her colleagues' possible actions. Earlier on in this chapter (section 7.3.1) Meena reflected on the need for teachers in her school to teach in a consistent way. She revisits this concern when she refers to 'some teachers' moving their pupils on to formal methods. Meena suggested that teachers should assess their pupils and teach informal calculations when necessary rather than move on in accordance with the NC's learning objectives.

Harry and Meena perceived that they had no choice but to teach formal calculations when they were stated by the NC. They appeared to lack autonomy due to the disconnection between their professional judgements and the statutory nature of the NC.

Holly and Tasha referred to the national tests. Holly said:

> Especially year five, who will be the toughest year group because they've only had a year, this year to start it. They've raised the bar so much, which is frightening and then they've only got year six, when of course you're supposed to be consolidating rather than teaching fresh and they are going to have to learn a lot more new skills in a very short period of time.

Tasha also reflected on time constraints within the following reflection:

> I just think it's almost gone completely the other way, so it's almost like in year three they need to know this, this and this and you are like, hold on how are

> they going to make the leap from here to here in five terms or six terms or whatever? It is so… I think that's a bit unfair but you have to start somewhere I guess.

Holly and Tasha suggested that pupils would be negatively affected as they experienced accelerated and new learning rather than securing their understanding at the end of key stage two. PCK for these two teachers relates to their awareness of the expectations of the national tests. They knew the areas where their pupils needed to secure or consolidate their understanding.

The NC introduced learning objectives that extended the concepts related to fractions. Tallula's concern was that pupils' prior learning had not prepared them for what she perceived as challenging learning objectives. Tallula's response was:

> They weren't ready, those objectives weren't relevant at all. The more able could touch on the new objectives but for most of the children there was no point teaching the further fractions when they didn't have the basics and you can't teach them, you can't move forward.

It seems that these five teachers experienced an impasse as they considered that their PCK was more appropriate than the NC yet they were not autonomous, they had to enact the policy. The teachers' responses support Perryman et al's (2012) argument that teachers can be directed by policy. In addition they became new professionals, which was unsatisfactory as they considered they knew best in terms of what and how mathematics was taught.

Michelle's response contrasts to those previously mentioned. She had not found the NC useful due to her perception that it constrained her pupils' attainment. Her response was:

> The children must have more understanding and breadth of knowledge, that's fine. But you've still got the children who are really, really exceeding and you're not - you can't push them on. I've got two in my class who are level six but I can't push them on.

Not finding the NC useful resonates with Michelle's response to phase two when she ignored the PNS. She is unable to ignore the NC as it is a statutory policy, which may explain her frustration regarding the level of challenge for two of her pupils. The NC states that 'pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content' (DfE, 2013: 99). Michelle's response refers to how the NC lacked challenge as it did not provide level six learning objectives. Wanting to 'push them on' shows Michelle made a professional judgement that she was not free to act upon. She inferred that as the NC had not provided level six learning objectives she could not extend her pupils' learning. She may have needed additional guidance regarding deepening and broadening pupils' understanding in order to review and update her practice.

Shulman (1986) refers to teachers' PCK and curricular knowledge in terms of relevance, i.e. in relation to the pupils' prior learning and knowledge of how mathematical concepts progress. With the exception of Tallula the teachers found the NNS useful, which suggests that the policy contained relevant guidance. For example informal calculations that showed how exchange works in subtraction that led to formal columnar calculations. Tallula started teaching the year the PNS was introduced and said that the policy gave her knowledge of how to teach. In phase three disconnections occurred when the teachers perceived that their PCK was secure and/or more relevant than the NC. They knew their pupils' learning and attainment needs, they were aware of the underlying concepts that needed to be taught and suggested that the NC did not. Harry, Meena, Holly, Tasha, Tallula and Michelle lacked autonomy as they did not feel free to act on their professional judgements. Instead, they made a choice according to an expected outcome, which was to enact a statutory policy document. Their responses echo Ineson's (2014) concern that the level of challenge in the NC assumes a negation of pupils drawing on mental strategies and using informal written calculations.

My findings clearly demonstrate how policy change designed to impact England's academic performance led to tension when teachers evaluated their capacity to teach. It seems that tension occurred when teachers considered their capacity to teach the NC. Molly, Tianna and Tina were confident that they could teach the NC and it seems that they were autonomous. In contrast the teachers who had not found the policy useful considered the implications of their lack of autonomy

on their pupil's learning. These teachers responded to 'governmental decisions' (Berry, 2012: 404), i.e. the transition of their practice and the pupils' previous learning to the increased level of challenge. Their previous practice, which includes policy enactments appears to have led to struggles to reconcile policy into their current teaching.

7.4 Mathematics schemes

The final theme is mathematics schemes. Teachers reflected on how their translation of the NC included them 'purchasing and drawing on commercial materials' to put the policy into practice (Ball, Maguire and Braun, 2012: 45). A mathematics scheme was purchased in four of the five schools in my sample. Michelle and Molly referred to themselves as purchasers. Five teachers reflected on their school's purchase, which suggests that they were recipients of the scheme. I do not know the events that preceded the purchase or if the teachers were involved in the decision making process. During the interviews I did not recognise the relevance of mathematics schemes as a potential theme and did not alter my interview questions to explore further. Therefore the responses that follow originated from the teachers raising the topic.

Schools were autonomous regarding the scheme they purchased. It seems that schemes were purchased to address concerns regarding the lack of guidance and the increased level of challenge in the NC. Teachers sought a connection as they needed additional guidance to bridge the gap, which the NNS and the PNS had previously provided. Mathematics schemes provide PCK including teaching strategies and activities, which Shulman (1986) suggests teachers should know, however it is helpful when this is provided by the authoritative and legitimate support of a mathematics scheme (Haggerty & Pepin, 2002).

Teachers interpreted the mathematics scheme in the same way that they had interpreted previous policies, i.e. they evaluated them in terms of how they would support their mathematics teaching. Teachers reflected on their justifications of the purchase or their use of the scheme and their early interpretations. The schemes did not always provide the guidance teachers needed, which illuminates Ball, Maguire & Braun's (2012) point that teachers' interpretations (of policy) are affected by their individual situations. Therefore my argument in this theme is that phase three signalled significant change for teachers. They sought supportive guidance from mathematics schemes based on their perceptions of what the school needed or their individual PCK needs.

Table 7.5 summarises whether the school's mathematics scheme was useful, useful to some extent or not useful.

Table 7.5: Teachers' responses for the theme mathematics schemes

Name of teacher	Teachers' perceptions of the usefulness of the mathematics schemes
Maisie	Useful to some extent
Maisie	Useful to some extent
Miranda	Useful to some extent
Terry	Not useful
Terry	Useful to some extent
Daisy	Useful
Heather	Useful
Michelle	Useful
Molly	Useful

I categorised the nine responses according to their perceptions of the usefulness of the mathematics scheme. Mathematics schemes were useful for four teachers as they were helpful and/or supportive. Teachers made connections to the scheme in terms of gaining security in their PCK, which is similar to their previous relationships with the NNS and the PNS. There are three responses (Maisie appears twice as she gave two contrasting responses) showing that the scheme was useful to an extent. Terry also appears twice and his responses show a recurrence of his fear of teaching mathematics the wrong way. Disconnections from the mathematics schemes occurred when teachers perceived that their professional judgements were more relevant. I focus first on the responses that suggested teachers found the scheme useful. The names of the mathematics schemes are pseudonyms.

Heather spoke of being ‘able’ to purchase a mathematics scheme following the removal of the PNS, which she cited as ‘helpful’. She went on to say that the mathematics scheme had facilitated the teaching of the NC. Heather told me:

> We use Bricklayers (pseudonym) Curriculum which is an approach to the National Curriculum, very cross curricular, creative and we had already bought into that and we have been using it for a couple of years before the new Curriculum came out. Which actually made the change to the new Curriculum very easy because Bricklayers revamped all of their materials and said, “Here you are, here it is.”

Heather’s acceptance of the mathematics scheme contrasts with the autonomy she experienced in phase one and had wanted in phases two and three. I suggest it was the extent of change within the NC and the lack of guidance that led to Heather’s perception that the scheme was needed. She appears to have welcomed the mathematics scheme as a necessary supplement for teaching the NC, which resonates with her need for teachers to have a source of PCK and be consistent in their mathematics teaching. In addition, she seems to have accepted the ‘revamped’ scheme without suggesting that it needed to be adapted, neither did she lament the loss of her school’s system as she had in her response to the PNS. It is interesting how Heather suggests that teachers will accept the scheme and be able to benefit in terms of their PCK. Earlier in this thesis (sections 6.4.1 & 7.2) Heather suggested that she wanted her teachers to be autonomous and act on their professional judgements. It seems that the NC led her to prioritise the need for a consistent approach to teaching mathematics effectively by using the scheme.

Daisy reflected that the mathematics scheme was ‘useful’ as it supported her school’s approach and provided ‘structure’ to teach the NC. Daisy told me:

> We have taken on the Deans (pseudonym) maths system in school and that has been a plus because it has given us a structure to work with, particularly as we move into the new National Curriculum. We are generally quite pleased with it because it does seem to be taking the steps that we think are sensible and also we have the freedom to move things around. You can see the

> progression of how you build things and you can take two steps forward and one step back and I think that is particularly useful.

Daisy's perception of the scheme was that it provided a starting point and contained supportive guidance that teachers could draw on to teach the NC. Her suggestion that teachers should 'move things around' echoes Taylor's (2013) point that mathematics schemes should be adapted.

Michelle considered how NQTs might benefit from the level of detail within the mathematics scheme. Her response was:

> I introduced a new scheme that we use and made sure that everyone has got that under their belt and then I check that they are using that and are confident to use it. It might be, you know if you're an insecure NQT coming into a school, great it works a treat, but then we have got Deans which has got whole daily planning. Literally it gives you a script of what to do. If you are a confident teacher then you can go, 'oh I'm teaching fractions of an amount this week, right here we go and off we go'. You know what you're doing, you set the slides up and you go.

In phase one Michelle spoke of how it had been 'fine' for her to be told what to do by the NNS as she had not been a confident teacher. She drew on this experience when she referred to 'an insecure NQT' who could benefit from the scheme's daily planning. Michelle suggests that the scheme would be followed closely by NQTs which echoes the point that mathematics schemes can be a source of confidence for new teachers (Haggerty and Pepin, 2002, Newton & Newton, 2006). She also reinforces the idea that new professionals are managed by policy (Hargreaves, 2000, Evans, 2008), which can be supportive. Michelle said that the scheme must be used, which is interesting as it echoes her response to the NNS while contrasting with her reflection of ignoring the PNS. Her point that confident teachers 'know what [they are] doing' supports Taylor's (2013) point that a scheme could be adapted by experienced teachers in accordance with their PCK. It is possible that Michelle's policy message may affect her colleagues' translation of the scheme, i.e. there is an expectation that teachers have it 'under their belt'.

The following responses from Molly and Miranda echo their concerns regarding planning in phase two. Miranda told me:

> With the new structure I'm sure you've heard we are using the medium-term plan and it's been written by somebody to cover the new Curriculum and people are finding it harder to plan from at the moment, but I think that's because it's new.

Miranda spoke of how the plan addressed the NC requirements yet teachers were having difficulties using it.

The medium-term plan purchased by Miranda and Molly was written by a colleague who used to be the LA's mathematics consultant. In phase two both teachers had concerns regarding the PNS' planning and it seemed that as they are mathematics coordinators they were responsible for supporting their colleagues. This sense of responsibility appears to have led to the purchase of a mathematics scheme. Molly told me:

> I did buy into a medium-term plan that we could use to get started with the new Curriculum. So we bought into that so everyone had a starting point that could help them incorporate the new objectives and so on. Basically people have sort of, maybe looked at what they had before, but also looked at the new document to see what else they need to include and tweak and change.

Molly appears to have purchased a scheme (the medium term plan) that she suggested provided a helpful 'starting point' that teachers could use and adapt if necessary. Molly's responses show a journey that started as a class teacher who considered her practice in phase one. In phase two Molly was aware of her responsibility to others while she also considered her own practice. Her perspective broadened in phase three to include an appreciation of NQTs and their need for support. Simultaneously she was secure in her PCK and was confident that she could teach the NC's increased level of challenge. Molly's final response reflects her responsibility to support teachers with their planning alongside an understanding that there is a range of PCK needs within her school. She recognised the need for the scheme to be adapted, which I suggest was affected

by how Molly had struggled with the PNS' planning. In addition she had maintained her autonomy across the three phases and wanted her colleagues to be autonomous.

There are two responses from Maisie. She perceived that the scheme was limited in terms of resources and not needed when preparing pupils for their national tests. In addition, the scheme could support teachers.

Maisie's interpretation of the scheme was that its structure, which is similar to the PNS, was useful. Her response was:

> I mean, since the new Curriculum's come in, we've bought a new scheme that tells us, gives us guidance that in these 3 or 2 week sequences we should be teaching these objectives. It's a Dark Night publication, it doesn't come with resources, they cost extra of course. But it's better than nothing.

The caveat in Maisie's response was that the mathematics scheme was 'better than nothing' which suggests that its usefulness is limited due to the lack of resources.

In a subsequent response Maisie justifies the purchase of the scheme while also saying that she had not used it when she prepared her pupils for their national tests. Maisie said:

> The scheme we spent a lot of money on, I want to know works. I didn't want someone saying, "I can't do this" and I can say, "Well I've done it." This term I am doing what I think is necessary for those kids, for SATs, where the gaps are, what they need to do to move forward and we're much more flexible.

The scheme was useful to some extent as Maisie advocated its use to her colleagues while stating that it was not applicable for teaching year six pupils. It seems that Maisie will always prioritise preparing pupils for their national tests as her response resonates with ignoring the PNS.

Terry's response continues his earlier point regarding teaching with depth and breadth. Initially he focusses on the medium-term plan that was purchased by the mathematics coordinator in his school. Terry said:

> We've now bought into a, because we literally had the list of objectives, some guidance is needed in how to divide these up into the term and ensuring these are covered and should you visit things once or twice? I don't know if you should or not but I know that we have bought into a scheme where it's all split into cycles and various objectives are introduced and revisited, so you could argue that that is support but it doesn't feel particularly supportive because we've just been given a cut-and-paste job of the objectives in real terms.

Terry had been teaching for 18 years when the NC was introduced and he had acquired PCK throughout his career. However he was unable to translate the plan into his teaching as it lacked the detail he needed and he had not felt supported. Terry sought further guidance and he went on to say:

> We need more guidance on how you define depth so by looking at West End we can see how the objectives are covered again and how those activities are tweaked and it's not perfect but it's a good starting point and we're beginning to work on that but it's so secret, we save it under a different name. It's ridiculous how teachers who have been teaching forever feel the need to do that because of this judgement of, 'Oh it's wrong to do it like that'.

Terry's purchase of the scheme was enveloped in secrecy due to his perception that he should not have needed to use a scheme as he had 'been teaching forever'.

During phase two when Terry was under pressure he referred to a fear of teaching the wrong methods, which led to him being steered by policy (Rizvi & Lingard, 2010). Fear emerged again in phase three leading to Terry's purchase of the West End mathematics scheme in secret. It appears that Terry believed that he would have been judged negatively by his colleagues for needing to use an additional scheme. Terry recognised that there would have been consequences of not enacting the purchases scheme, which seems harsh as his need for guidance had not been met. Therefore he had no choice but to pursue an alternative means of support.

In sum, teachers turned to the safety and reliability of mathematics schemes in response to the need for guidance to teach daily mathematics lessons, which Ball, Maguire and Braun (2012) refer to as taking action in order to produce certain outcomes. Teachers made connections to the schemes when they were perceived as a source of PCK that provided the structure and detail needed to teach. Mathematics schemes were useful when teachers considered them as supplementary, adaptable starting points containing PCK. A disconnection occurred when teachers considered their professional judgements were more relevant than the scheme. In these instances schemes were useful to some extent as they provided a starting point form which teachers considered their PCK (Maisie) or sought additional guidance (Terry). However not all teachers benefitted as the scheme could not address their individual needs, which resonates with my findings regarding the NNS and the PNS.

Autonomy is paradoxical within the context of teachers purchasing mathematics schemes. On the one hand schools had autonomy regarding which scheme they purchased yet teachers were not autonomous when they were recipients of the scheme. Heather advocated how schools and teachers should be autonomous yet they had been constrained by the PNS. The removal of the PNS appeared to alter Heather's perception as the purchase of a mathematics scheme meant that teachers were limited in their professional judgements. Michelle seems to associate autonomy with experience and she suggested that a mathematics schemes would be useful for NQTs. A further paradox came from Maisie who said that the scheme 'tells' and 'guides' teachers which suggests that professional judgements were not needed. Maisie appears to be autonomous as she prioritised her preparation for the national tests over her use of the scheme.

In contrast, Daisy and Molly seem to say that teachers could be autonomous as they would review and update their practice according to their PCK and their professional judgements of the scheme. Finally, Terry was autonomous in his decision to purchase an additional mathematics scheme yet his autonomy was simultaneously limited when he perceived he should not have acted on his professional judgement.

Coburn's (2001) point that teachers' autonomy is related to outcomes can no longer be considered as a singular action, i.e. teachers collectively make sense of policy and take action. My findings appear to develop Coburn's (2001) point as I have argued that teachers addressed

different outcomes that were rooted in their need to manage the transition to the NC. Their autonomy was paradoxical as they could choose which scheme to enact (but not all teachers) but they were bound by the expectation that they taught the statutory NC (Helsby & McCulloch, 1996, Berry, 2012, Burkhauser & Lesaux, 2017).

7.5 Summary of findings for phase three

Between the removal of the PNS in 2011 and the introduction of the NC in 2014 teachers were teaching mathematics without additional policy guidance. With regard to prescriptive practice teachers responded to the end of the NS in contrasting ways. My findings suggest that ten teachers evaluated their PCK, which led to one of the following two responses. Firstly, five teachers lamented the loss of support that the NNS and/or the PNS had provided. Danica, Dom, Hannah, Harry and Tallula had spoken about how they gained PCK. For example, Hannah reflected that she could differentiate her teaching when she saw the objectives for consecutive years listed. The teachers perceived that they could not make professional judgements and they lacked confidence to make mathematical connections therefore they lacked autonomy. Their lack of confidence echoes Evans (2008) concern that demanded professionalism leads to functional development. The temporary development gained by these five teachers could have been made permanent if they had received additional CPD that developed and secured their PCK (Storey, 2009). In contrast five teachers appear to have welcomed the lack of prescriptive policy. Heather, Tara, Tianna, Tina and Tracey spoke of the removal of constraints that gave them the chance to be autonomous. For example, Tracey reflected that she could decide how long to spend on topic coverage.

The NC introduced substantial changes to teachers' practice that led to contestations as they interpreted the policy. The responses underline Shulman's (1986) point that teachers' PCK includes how to facilitate pupils' learning through their selection of key teaching points, the use of models and knowledge of their pupils. In addition, teachers drew on their professional judgements, formed when they critically considered the appropriateness of the increased level of challenge in the NC. The acceptance of the NC as a statutory policy document, regardless of teachers' contestations and the tension they encountered supports Ball, Maguire & Braun's (2012: 138) claim that resistance to policy is 'rare and fleeting'.

Five teachers who spoke of being secure with their PCK welcomed the lack of guidance in the 2013 NC while suggesting that NQTs and ECTs would require support. Holly, Tanya, Tessa, Tony and Molly suggested that guidance similar to the NNS and the PNS would be beneficial for new teachers to select their teaching methods and activities. In addition 11 experienced teachers referred to the implications of teaching the NC. They sought a connection to policy when they felt that their PCK was insecure. The topics of PCK that teachers were concerned about were assessment, planning and progression. The implications of these concerns were teachers losing confidence, spending time researching how to teach or pupils missing out on learning concepts. These teachers had been supported by the NNS and/or the PNS, i.e. they were new professionals, hence there is a tension in terms of new professionals who are unable to access policy that could support their enactment of the NC.

Teachers appeared to be at an impasse when they drew on their secure PCK and they were critical of the NC while lacking the autonomy to act on their professional judgements. Tahreem's response is interesting as she appeared to be secure in her PCK yet she lacked autonomy. She spoke of how the number line is beneficial for pupils' understanding of multiplication yet she suggested that she no longer taught this method as it does not appear in the NC. Autonomy and PCK became connected when teachers could not make professional judgements as they could not draw on their PCK to know what to do.

Three teachers were secure in their PCK and disconnected from the need for policy guidance. Molly, Tianna and Tina considered that the NC is appropriate in terms of its increased level of challenge. In contrast six teachers disconnected from policy when they perceived that their secure PCK was more relevant than the Curriculum. Harry, Meena, Holly, Tasha, Tallula and Michelle spoke of concerns regarding their pupils' capacity to manage the new learning objectives, e.g. 'further fractions' could not be taught until pupils had learnt 'the basics' (Tallula). Teachers were at an impasse, they lacked autonomy when they suggested the NC had to be enacted despite their contestations.

Mathematics schemes were seen as supportive guidance to help teachers enact the NC. Four responses demonstrate that schemes provided much needed PCK, e.g. duration of topics (Maisie). Maisie advocated the scheme whilst saying that she would not use it when preparing

her pupils for the national tests, which shows how the effectiveness of a scheme is subject to interpretation and that a scheme can have limitations. Terry's response demonstrated how a scheme cannot be sufficient when a teacher needs specific CPD.

Autonomy was paradoxical as schools appear to have decided which scheme to purchase while teachers potentially lacked autonomy as they may have wanted to teach their own way or purchase a different scheme. Heather's need for consistent teaching in her school appears to have superseded her argument (particularly in phase two) that teachers and her school should be autonomous. The paradox of Terry's autonomy is his feeling that he had to keep secret his action of purchasing a mathematics scheme that met his needs regarding teaching with depth and breadth.

Chapter Eight – Conclusions

8.1 Introduction

This concluding chapter addresses my research questions as I make tentative conclusions of my findings. First I explain how each phase is distinct by summarising the teachers' responses, which addresses the first two research questions. Then I turn to the third research question as I discuss the similarities and differences between and within the phases. Following this I reflect upon the uses and limitations of the theoretical frameworks. These are Ball, Maguire & Braun's (2012) policy enactment theory and to a lesser extent Burr's (2015) social constructionism theory. I move on to state the four key limitations of my study and I present potential further research that could develop my findings. Finally I suggest recommendations for policy writers and teachers.

My research questions are:

1. What are primary teachers' reflections on their responses to three phases of the Primary National Strategy (PNS)?

2. What are their perceptions of the effect these responses had upon their experiences of teaching mathematics in the following phases?

- Phase one – Prior to the launch of the PNS
- Phase two – During 2006-2011 while the PNS was current policy
- Phase three – Following the removal of the PNS

3. How are responses similar or different between each phase and within the phases?

8.2 Summary of findings

I suggest that my conclusions are underpinned by the following point. Teachers have differing levels of confidence, experience and PCK that affected their perceived capacity to teach mathematics and also their autonomy. I have argued that teachers constructed their professionalism as they enacted policy **or** their enactment of policy was affected by their professionalism. This theoretical consideration arose when I realised that teachers considered their professionalism in terms of their autonomy, PCK and their professional development needs.

Connections to or disconnections from policy relate to teachers' PCK. Teachers made connections when they constructed their professionalism as they enacted policy, e.g. they gained security in their PCK. My findings indicate that teachers made connections when they updated or replaced their PCK from the policy guidance. Disconnections occurred when teachers perceived that their PCK was more relevant than policy in terms of their mathematics planning and teaching.

The ways in which teachers made connections to or disconnections from policy varied within my findings. Teachers simultaneously considered how policy might affect their practice, drawing on their policy biographies and teaching experiences (Ball, Maguire and Braun, 2012: 43). For example, in phase one Hasnia became more secure in her PCK, i.e. her professionalism was constructed through her enactment of the NNS. She made a connection to policy. Making connections to policy was difficult for Deanna and Tianna. While they perceived that the NNS was enhancing their PCK they also suggested that they had no choice but to enact the policy. Teachers sought a connection in phase three when they perceived that they needed guidance to teach the NC. I have argued that these teachers' PCK was rooted in their policy enactments, which led to them being insecure when the NS were removed. An example comes from Tasha who questioned how she might fill the gaps in the NC (see section 7.3.1).

There were two ways in which teachers made disconnections from policy. First teachers' professionalism affected their enactments of the policy and/or the policy situation. I argued that Dabria considered that teaching the numeracy hour was not conducive to listening to her pupils (section 5.3). She appeared to consider that her PCK was more relevant than the NNS hence the disconnection, however she did seem to adhere to the timings despite her dissatisfaction. The disconnection from policy was apparent from Dabria's reflection but less so from her enactment, possibly because she had been trained with the NNS and had only experienced teaching the numeracy hour. In phase two Maisie and Harry perceived that they were autonomous and they ignored the PNS in order to focus on preparing their pupils for the national tests. Phase three was complex as there were disconnections between teachers' professionalism and a) the policy situation and b) the 2013 NC. E.g. in response to the removal of the PNS Tianna was autonomous and secure in her PCK which led to her perception that she could teach mathematics without policy guidance.

The second way in which teachers made disconnections from policy is when they were insecure about their PCK that was rooted in their previous experiences. Terry suggested that he could not teach the NC as he did not know how to teach mathematics with depth and breadth. He suggested that his 'skills of being a teacher for nearly 20 years' should have been sufficient while simultaneously being insecure about his PCK.

In sum, teachers made connections to policy when they could update or replace their PCK. Disconnections occurred when they perceived that their PCK was more relevant than policy or when teachers became insecure about their PCK.

Table 8.1 shows the themes that emerged in each phase (listed in alphabetical order). I include ratios that signpost the teachers' perceptions of the usefulness of the policy. The ratios indicate the number of teachers who found the policy (the policy situation or the 2013 NC in phase three) useful : useful to some extent : not useful. The final row of the table shows the total number of responses that I also present as a ratio.

Table 8.1: The themes that emerged in each phase

Phase one Useful : useful to some extent : not useful	Phase two Useful : useful to some extent : not useful	Phase three Useful : useful to some extent : not useful
		Mathematics schemes 4 : 4 : 1
PCK, policy and professional judgement 11 : 3 : 7	PCK, policy and professional judgement 1 : 0 : 16	PCK, policy and professional judgement 2 : 6 : 18
Policy was a means of professional development 9 : 0 : 2	Policy was a means of professional development 5 : 4 : 1	
Prescriptive practice 0 : 1 : 2		Prescriptive practice 5 : 0 : 5
	Pressure 2 : 0 : 4	
Total number of responses 20 : 4 : 11	Total number of responses	Total number of responses 11 : 10 : 24

	8 : 4 : 21	

Comparing the teachers' responses by ratio of the policy's usefulness shows how their perceptions changed. Phase one was the most useful for teachers while phases two and three had higher numbers of teachers who had not found the policy situation or the NC useful. I explore this point as I summarise my main findings.

Phase one

Teachers reflected on the NNS in terms of professional development, PCK and prescriptiveness. 24 teachers found the NNS useful or useful to some extent, which suggests that the policy was accepted as the way that mathematics should be taught and that teachers benefitted from the policy. However 11 teachers perceived that the policy had to be enacted and it took priority over their current practice.

In terms of professional development Daisy, Danica, Heather, Holly and Tessa spoke of specific aspects of PCK that were enhanced by their enactments of the NNS. For example, Daisy gained a greater understanding of pupil progress. Heather considered that the framework supported teachers who were insecure with their PCK. Tracey, Harry and Dom made a connection to their ITE where they received the NNS. Only two teachers reflected on the NNS' training and the contrasting responses of Maisie and Terry demonstrated how their perceptions were affected by their expectations.

Within the theme PCK, policy and professional judgement there were 21 responses, 11 of which show that teachers found the NNS useful. Teachers with four or less years of teaching experience seemed to make a connection to the NNS. I drew on Shulman's (1986) idea of relevant PCK and identified the parts of the NNS to which teachers suggested the policy had been useful. Taluja, Tasha and Tricia found the structure of the numeracy hour useful. I was unable to argue that all teachers found the same parts of the NNS useful, there were times when teachers enacted the policy despite considering that their PCK was more relevant. E.g. Dabria felt rushed when teaching the numeracy hour.

Ten responses suggested that teachers found the NNS useful to some extent or not useful. Hasnia, Dabria, Maisie, Tanya and Tara were disconnected from policy as they perceived that their PCK was more relevant. They did not feel that they could adapt or ignore the policy. Tanya had taught for 21 years before the introduction of the NNS. She seemed to be overwhelmed by the number of teaching methods. Connections were difficult for Deanna and Tianna. Deanna, for example connected with the NNS in terms of division while considering that not all of her colleagues understood division by chunking. When teachers enacted policy despite being dissatisfied I argued that they lacked autonomy, which I discuss in section 8.4.3.

I included the theme prescriptive practice in phase one in order to introduce the theme. Molly, Heather and Taluja referred to the NNS in terms of a policy that contained rules that had to be followed. The NNS was not useful for Heather and Taluja whose length of time teaching contrasted (23 years and 0 years respectively). Both teachers perceived that they lacked autonomy. It seems that Molly perceived that she was autonomous based upon her comparison to the reduction of her autonomy in phase two.

Phase two

Teachers appeared to take a more critical stance to the PNS and appeared to prioritise their PCK over the policy (i.e. there was a disconnection from the policy). Pressure was experienced by three head teachers; Hasnia, Heather and Holly who suggested that they would have liked to have had time to decide how their school could respond. The PNS was not useful for these three teachers. Teachers who were part of the ISP experienced pressure in a different way as they needed to take action that would lead them out of the Programme. Danica, Taluja and Terry adhered to the PNS yet they responded in different ways. For example Taluja wanted to show the LA consultant that she was taking steps to raise attainment.

I have argued that teachers' perceptions of how the PNS enhanced their practice affected how the policy was seen as a means of professional development. Daisy, Miranda, Molly, Tahreem and Tallula recognised potential enhancements to their practice that they referred to as helpful. Daisy, for example benefitted from 'ideas' that she could use 'elsewhere'. Tallula was a NQT in 2006 and spoke of the PNS in a general sense, i.e. it gave her 'teaching ideas'. Critical evaluations of the PNS led to teachers considering the policy as supplementary guidance for their

already secure PCK. Dom Terry, Tabitha and Tessa made selections regarding how their practice was enhanced, e.g. topic coverage (Dom). Heather, however considered that teachers' autonomy would determine how the policy provided professional development.

Criticality was evident in the teachers' responses regarding PCK, policy and professional judgement. All but one of the 17 teachers said that the PNS had not been useful. I suggest this was because there was a disconnection from the policy as teachers considered that their PCK was more relevant. Heather, Dabria, Deanna, Miranda and Molly spoke of misalignments regarding planning, pace of progression and attainment. An example of a misalignment is Maisie's concern that there were too many methods to teach, which confused the pupils. Despite their dissatisfaction these teachers appear to have enacted the PNS as they did not feel that they had a choice. Tina ignored the PNS as she did not have time to familiarise herself with the policy and her colleagues were using the West End mathematics scheme. Dom, Tracey and Michelle also ignored the PNS as they continued with their existing practice. Four teachers adapted the PNS drawing on their PCK and experience. Deanna, Meena and Tony drew on their enactments of the NNS and adapted the PNS. Tara suggested that her PCK was secure, which enabled her to adapt the duration of topics.

Phase three

I introduced the theme of prescriptive practice in phase one in terms of teachers' perceptions that the NNS contained rules that had to be followed. In phase three the term prescriptive practice relates to the detailed, useful structure that teachers had known in the NNS and the PNS. The removal of the PNS led to Heather, Tara, Tianna, Tina and Tracey drawing on their secure PCK to disconnect from the policy situationand decide how they would teach mathematics. Heather spoke of having the chance for her school to be autonomous. In contrast Danica, Dom, Hannah, Harry and Tallula tried to continue their enactments of the PNS, which suggests that their PCK was connected to policy.

With regard to PCK teachers reflected that there was a lack of guidance available when the 2013 NC was introduced. Holly, Tanya, Tessa, Tony and Molly drew on their secure PCK to empathise with NQTs and ECTs who had limited experience and would not have guidance (such as the NS) to aid their teaching of the NC. Deanna's response seems to have reinforced her perception that

teachers should be secure in their PCK, disconnect from policy and be autonomous. Therefore the lack of guidance in the NC was useful as teachers could make professional judgements to decide how and when to teach the learning objectives.

Connections were sought when teachers suggested that they would have benefitted from guidance. Teachers perceived that they lacked the capacity to teach the NC as they lost sight of their previous experiences and 11 teachers referred to the NC as not useful. Terry and Tracey were unclear of how they could teach with depth and breadth. Dabria and Taluja were concerned about how the NC might be interpreted. Other concerns included not knowing how to teach the learning objectives or how the NC would be assessed (Danica, Meena, Tabitha, Tahreem, Tallula, Tasha and Tricia). These teachers were at an impasse as they became insecure about their PCK. They felt the need for guidance yet had to teach the NC in their daily mathematics lessons.

In terms of the increased level of challenge in the NC Molly, Tianna and Tina were secure in their PCK and disconnected from the need for policy. Harry, Holly, Meena, Michelle, Tallula and Tasha also disconnected as their PCK was secure and more relevant in terms of the expectations stated in the NC learning objectives. I suggested these teachers were also at an impasse as they perceived that they could not adapt the NC to address their concerns, i.e. they lacked autonomy. For example Tallula said that 'further fractions' could not be taught as pupils did not have the 'basics'.

Mathematics schemes were seen as a source of additional guidance that schools purchased. Teachers cited a range of reasons for using a scheme, e.g. to support the teaching of the NC (Heather, Daisy, Maisie, Michelle, Miranda, Molly). Terry purchased an additional mathematics scheme to support his need for guidance to teach with depth and breadth. I suggested that mathematics schemes were seen as a source of PCK that could support teachers. However, their interpretations of the schemes suggested that they were not always satisfied with their purchase. E.g. the lack of resources in the Dark Night scheme purchased by Maisie.

Having summarised the findings for each phase I now discuss how the teachers' responses were similar or different between and within the phases.

8.3 The similarities and differences between each phase and within the phases

Addressing my third research question enables me to examine the similarities and differences among the teachers' responses. By comparing the similarities and differences I am able to select key findings that formulate my tentative conclusions. These conclusions are summarised below.

- Professional development
- Policy, PCK and teachers' professional judgements
- Autonomy

In what follows I expand upon my conclusions, starting with a discussion of professional development.

There were variances in teachers' responses within and across the phases, hence the data I collected were plentiful. Focussing on five policy cases and discussing these in detail enabled me to recognise the complexities of the teachers' responses. I selected the policy cases in accordance with my interpretations of the teachers' experiences. I selected teachers from each of the teaching positions, i.e. head teacher, deputy head teacher, mathematics coordinator and class teacher. Heather purchased a mathematics scheme following the removal of the PNS, which appears contrary to her responses to phases one and two where she spoke of wanting her colleagues and her school to be autonomous. Molly's responses contained a mixture of perspectives as she reflected as a class teacher and/or a mathematics coordinator. Tina suggested that she had no choice regarding her enactment of the PNS as the policy was in situ when she returned to school from maternity leave. She spoke of a sense of 'freedom' following the removal of the PNS, which meant that she could now be autonomous.

In addition I reflected on teachers' reflections that I perceived to be unique. Deanna threw the NNS way and was critical of the pace of progression in the NNS and the PNS. She was the only teacher who found the lack of guidance in the 2013 NC useful. Deanna appeared secure in her PCK across the three phases, which affected her perception of her colleagues' PCK and what should be included in mathematics policy. In phase one Michelle referred to the NNS as a source of confidence for herself as a NQT. In response to phase three Michelle appeared to draw on her experience when she suggested that a mathematics scheme could be a source of confidence for NQTs and ECTs.

8.3.1 Professional development

NCETM (2009) state that professional development should show teachers a range of ways that mathematics can be taught, including useful tasks and resources. In phases one and two teachers gained their professional development through an engagement with the Framework folders and the policies' planning. Sometimes teachers referred to professional development in a general sense, e.g. Heather said that the NNS 'supported people who didn't have a full maths knowledge'. At other times teachers reflected on a specific PCK topic such as differentiation.

Enhancements to teachers' practice were gained when they recognised potential professional development and understood, i.e. they had the 'will and capacity' (Spillane, 1999: 144) to make changes based on their reading of the policy. Teachers made connections in their mathematical understanding that resulted in their needs being met (Storey, 2009). Teachers gained professional development in a selective manner in phase two as they made professional judgements on how they would change their current practice.

Phase three was a period where teachers showed that they had gained attitudinal development. This tentative conclusion is supported by 12 teachers who said that they could manage the transition to phase three as their PCK was secure. 22 teachers suggested that they did not know how to teach, which demonstrates how their previous professional development was shaken, even lost in response to the significant policy change. They had experienced functional development, i.e. they had changed their practice in response to policy. Evans (2008) suggests that functional development is temporary. My findings support this idea while also suggesting that functional development is superficial rather than deep-rooted.

Professional development is important for the enhancement of teachers' PCK. Policy can provide professional development however it cannot address the individual needs of teachers. The professional development that is rooted in teachers' policy enactments can be temporal and therefore lost when there are changes to policy. My findings suggest that schools need to create and enact a CPD programme that addresses teachers' PCK and the whole school approach to mathematics teaching.

8.3.2 Policy, PCK and teachers' professional judgements

PCK is the knowledge of how mathematical concepts work and teachers should be able to explain these according to their pupils' prior learning (Shulman, 1986). Askew et al (1997) suggest there is a connection between teachers' subject knowledge and their capacity to teach mathematics. Teachers need to develop, or repackage their subject knowledge into PCK (Askew et al, 1997, Brown & McNamara, 2011). Policy has an effect on teachers' PCK as methods of teaching and sequences of learning (for example) may not align with teachers' professional judgements. The PCK topics to which teachers referred are listed in table 8.2. These appear in alphabetical order and topics are highlighted if they recur within the phases.

Table 8.2: The PCK topics by phase

Phase one	Phase two	Phase three
• Differentiation • Planning • Progression • Questions • Talk/activities • The numeracy hour • Vocabulary • Worked examples of calculations	• Expectations of pupil attainment • National tests • Planning • Progression	• Assessment • Expectations of pupil attainment • National tests • Planning • Progression • Worked examples of calculations

Key to the highlight colours:

- Pink shows a topic that appears in phases one and three
- Green shows a topic that appears in phases two and three
- Blue shows a topic that appears in each phase

The table shows how PCK was considered in detail in phase one, which resonates with the level of detail in the NNS. The most significant contrasts in terms of how each phase affected PCK topics relate to planning and progression. In terms of pupils' learning and attainment needs teachers perceived that their PCK was more relevant than policy in phases two and three. This suggests tension as national policy cannot meet the needs of pupils as teachers know their pupils' prior learning and appropriate next steps.

The teachers who found the NNS useful were NQTs or ECTs. Specific PCK topics were included, e.g. differentiation, the structure of the numeracy hour (see table 5.4). Teachers made

connections when they combined or updated the NNS' PCK with their own, which benefitted their practice. Hence there is an overlap in terms of PCK and professional development. Hasnia gained an understanding of the concepts involved in written calculations. Meena and Molly spoke about progression. Taluja and Tessa referred to the vocabulary booklet. Hannah could differentiate due to the layout of the framework and she also reflected that teachers were able to structure their lessons in terms of talk and pupil activities. The numeracy hour was liked by Taluja, Tasha and Tricia. Michelle did not refer specifically to a PCK topic as she reflected upon gaining confidence from the NNS.

However not all NQTs and ECTs found the NNS useful and ten teachers experienced a disconnection, i.e. their PCK was more relevant than the policy. For example Dabria felt that she was not listening to her pupils as she was focussed on including the content of the numeracy hour. The PCK topics discussed by teachers were worked examples of calculations (Tanya), planning (Maisie, Tanya, Tara, Tianna & Deanna) and progression (Deanna & Tara). Teachers were dissatisfied with the feeling that they had no choice but to adhere to the NNS, which overlaps with autonomy (I discuss this in section 8.4.3).

In phase two teachers spoke about fewer PCK topics (see table 6.4) yet the focus of their responses extended to broader concerns regarding the implications of using the PNS' planning. Disconnections occurred and I suggest this was because teachers were experienced SLT members (Miranda, Molly, Deanna, Maisie, Dabria and Heather) who were secure in their PCK. There appeared to have been tension between teachers recognising misalignments between policy and their practice and their lack of autonomy. Six teachers ignored the PNS when they prioritised their current practice over the policy (Dom, Harry, Maisie, Michelle and Tracey). Tina was an exception as she ignored the PNS following her return from maternity leave and I return to Tina in my discussion of phase three. Adaptations to the PNS occurred when Deanna, Meena and Tony evaluated the PNS and their PCK and the policy was useful to some extent for these teachers. I contend that these three teachers prioritised their PCK, which was secure, and they drew on their experience, hence they were autonomous.

In phase three, following the removal of the PNS there were difficulties for five teachers whose PCK was insecure and they sought a connection to policy for guidance. The five teachers who

were secure in their PCK benefitted from the disconnection from policy. Teachers' responses to the NC suggested that they would have appreciated guidance similar to the NNS and the PNS. I have argued that it was the extent of the changes in the NC that led to teachers' perceptions that their PCK was insecure.

With regard to disconnections from policy Harry, Meena, Holly, Tasha, Tallula and Michelle perceived that the NC is too challenging in terms of their pupils' learning and attainment needs, particularly in terms of their prior learning. Deanna's response supported her previous disconnection from the NNS and the PNS, thus her professional judgement was almost always more relevant than policy. Alternatively Molly, Tianna and Tina reflected on their capacity to teach the NC. They made a connection to their secure PCK and considered the level of challenge in the NC manageable.

The teachers' responses to the 2013 NC show how policy change can have a substantial effect on teachers' daily mathematics teaching. Teachers reached an impasse when they perceived that they did not know how to teach the NC or they were concerned for their pupils. Teachers wanted guidance in order to enact the NC but none was available. Mathematics schemes were seen as a source of PCK following the removal of the PNS (Heather) or upon the introduction of the 2013 NC (Maisie, Miranda, Terry, Daisy, Michelle and Molly). While the schemes appear to have provided safe and reliable guidance teachers interpreted the mathematics schemes and made professional judgements in accordance with their PCK. The schemes were recognised as a source of PCK, which resonates with the teachers' responses to phases one and two with policy being replaced by a purchased scheme.

Heather's responses show her reflections from the perspectives of class teacher and head teacher. The following summary shows how PCK and autonomy overlap. Heather started teaching in 1976 and became head teacher in 2010. She considered that the NNS supported teachers whose PCK was not secure. When reflecting on her own situation she referred to being 'reined in' and that policy had been 'prescriptive' which suggests that she recognised the loss of her autonomy. In phase two Heather's perception that policy reduced autonomy strengthened when she spoke of having to do what was expected regardless of her school's system, i.e. she reflected as a head teacher. She considered her colleagues again when she reflected that the

PNS unsettled teachers 'who actually knew how to teach' as she drew on her extensive teaching experience. Heather was autonomous in her own enactment as she used the PNS as supplementary guidance. It seems reasonable that Heather found the removal of the PNS useful as this meant that teachers could draw on their PCK and be autonomous. Therefore it was surprising that she purchased a mathematics scheme, suggesting that she wanted to provide a consistent approach and thusly reducing the need for teachers to draw on their PCK or be autonomous. Heather used the terms 'we' and 'us' suggesting that she spoke on behalf of her colleagues in school. She also reflected as 'I' from a head teacher's perspective and her own practice as a class teacher.

I tentatively conclude that the relationship between teachers' PCK and their professional judgements can be complex. The specific and detailed PCK provided by the NNS was useful for NQTs and ECTs. It seems that as teachers gained experience within phases one and two they considered that their PCK was more relevant than policy. All but one of the 17 responses to the PNS were critical, which suggests that teachers' PCK had developed, possibly as an outcome of their enactment of the NNS. When teachers perceived that they had no choice but to enact policy they disregarded their professional judgements, despite being dissatisfied.

A surprising finding is that teachers drew on their PCK to evaluate the NNS and the PNS, however in the absence of policy they became insecure about their PCK. Significant policy changes, such as the introduction of the NNS and PNS were accompanied by professional development events. The 2013 NC was significant because the content was more challenging (Gove, 2011). In phase three 24 teachers spoke of a lack of guidance and/or the need for a mathematics scheme. My findings suggest that 11 teachers were at an impasse when they were insecure about their PCK and had to teach the NC. Schools could have benefitted from training, provided by mathematics specialists, as recommended by ACME (2013). Although mathematics mastery training was available I suggest that teachers required specific and bespoke training to address their insecure PCK. I revisit the importance of professional development within my recommendations (section 8.9).

My findings show that PCK overlapped with autonomy several times. I discuss autonomy in the following section.

8.3.3 Autonomy

The definition of autonomy is that teachers make professional judgements and are free to act upon these (Pitt & Phelan, 2008). My findings clearly show how teachers' autonomy varied and the following tentative conclusions focus on when teachers felt they were autonomous or when their autonomy was limited. I offer suggestions as to what it was about each phase that affected teachers' autonomy, recognising their evaluations of the policy, their perceptions of their PCK and their school's response to policy. I introduce the idea of schools' autonomy, which recognises where teachers' enactments are part of a collective response to policy.

Professional judgement is more relevant than policy

Deanna seemed to lack autonomy in phase one when she enacted the NNS without adapting the planning. She became autonomous upon noticing that the pupils' learning and attainment needs had not been met. Deanna recognised that she had to move away from the policy to address the issue, hence she acted on her professional judgement. In addition 11 NQTs and ECTs evaluated the Framework and the vocabulary booklet and selected the parts they considered useful. They were autonomous because they made professional judgements based on their evaluations of the NNS and then took action by changing their practice. These NQTs and ECTs were new professionals as they chose to be managed by policy yet they were also autonomous when they made judgements as to how they enacted the NNS in order to gain security of their PCK (see section 5.3). I have argued that teachers who ignored or adapted the PNS were autonomous (with the exception of Tina who I discuss in the section titled schools' autonomy).

Policy superseded teachers' autonomy

Teachers were not autonomous when their responsibility to enact the NNS went 'over and against' (Ball, Maguire and Braun, 2012: 44) their professional judgements. For example, Dabria taught the numeracy hour despite being concerned that she was not listening to her pupils, which compromised her teaching and most likely involved her missing potential teaching points. NQTs, ECTs and experienced teachers (Tanya had been teaching for 21 years) perceived that they had to enact the NNS as it showed the government's 'definition of what works' (Webb et al, 2004: 90).

The idea that teachers had to enact policy despite their professional judgements strengthened when Miranda, Molly, Deanna, Maisie, Dabria and Heather (SLT members) raised concerns about their practice and the potential implications for pupils. Rather than draw on their experience and their secure PCK they perceived that the PNS was authoritative and therefore it superseded their professional judgements. Their responses resonate with Ball, Maguire & Braun's (2012: 90) point that when policy is perceived as controlling 'pragmatism and necessity trump wider responsibilities towards students'. When policy superseded teachers' autonomy teachers were new professionals who were managed by policy, which was a negative situation.

I have argued that the NC changed significantly from its predecessor and 11 teachers sought guidance. These teachers appeared to lose sight of their previous teaching experiences and considered that they lacked the ability to teach the new, statutory NC. With the exception of Deanna (who I discuss in the schools' autonomy section) these teachers lost their confidence, which reduced their autonomy.

With regard to the increased level of challenge in the NC three teachers were autonomous as they perceived that their secure PCK enabled them to teach the more demanding learning objectives. In contrast, six teachers reflected that the pupils would struggle to make the transition. These teachers should have been autonomous as they made professional judgements that were relevant in terms of the learning and attainment needs of their pupils. It seems that the statutory nature of the NC limited their autonomy as they perceived that they had to teach the NC despite their contestations.

In phase three the paradox of autonomy was that teachers had drawn on their experience and PCK when they made their critical professional judgements of the NC. They were free to take action yet did not due to their doubts regarding their PCK and the disconnection to their previous experiences. Teachers were aware that they had to teach the NC within their daily mathematics lessons and that there was an expectation that the learning objectives were taught.

Schools' autonomy

The literature refers to the paradoxes of autonomy, i.e. teachers are free to act within the constraints of the performative environment in which schools operate (Berry, 2012, Pratt, 2016).

My findings suggest that autonomy is paradoxical in different ways, relating to schools' autonomy and the significant change experienced in phase three. The paradox of school autonomy is that while the school as a collective of staff is free to make professional judgements and take action individual teachers may not get to respond in the way they would like.

Tianna suggested that schools can be autonomous when teachers take part in a collective response to policy. This limited her individual autonomy and did not appear to have been agreed through collaborative discussion. Taluja's reflections suggested that, similarly to Tianna, she lost her individual autonomy while she followed the actions of her colleagues, i.e. her school was autonomous.

Three head teachers advocated the need for their schools to be autonomous in phase two. As senior leaders Hasnia, Holly and Heather wanted to resist the pressure they (and their colleagues) experienced in terms of needing to replace their current situation with the PNS and to respond quickly. They spoke on behalf of their school and inferred that as head teachers they should make professional judgements and have time to make changes in their school. Teachers whose schools were part of the ISP were autonomous in regard to judging that the PNS would aid their progression out of the Programme. Simultaneously they had limited autonomy as there was no perceived alternative, therefore they were new professionals whose choice to be managed by policy provided safety and reliability.

In the purchase of mathematics schemes schools made professional judgements regarding the need for a scheme and were free to purchase whichever one they wanted. Simultaneously teachers' autonomy was reduced as they did not consider that they could make professional judgements regarding how they planned and taught the NC. The following example from Tina demonstrates this point (her response was to phase two and is relevant to schools' autonomy).

Tina ignored the PNS and her autonomy was limited by being on maternity leave and missing the launch of the policy. She had not been part of her colleagues' decision to use the West End mathematics scheme. Thus her individual autonomy was superseded by the school's response. Although the school appeared to have been autonomous Tina's response highlights how individual teachers lose their autonomy when they are not part of the collective decision making.

Deanna alluded to school's autonomy in phase one when she threw away the NNS and asked teachers to plan and teach mathematics without the policy. She wanted everyone to respond in the same way. Deanna suggested that teachers should decide their pupils' pace of progression within her response to phase two. In phase three she referred to her school having guidance regarding the coverage of topics. I suggest that a school calculation policy could equate to her school being autonomous.

The NS introduced two reforming policies between 1999 and 2011, firstly the NNS (DFEE, 1999) and then the PNS (DfES, 2006). Following the removal of the NS, teachers interpreted the 2013 NC while making sense of the mastery agenda. Policy can be powerful when it leads teachers to disregard their professional judgements and my findings support Ball, Maguire and Braun's (2008) point that teachers cannot resist policy when they work in a culture of accountability and performativity. Being autonomous is part of being a professional (Bottery, 1996) and teachers should take the action that they consider necessary in their responses to policy.

Policy affected teachers' autonomy in a range of ways. Teachers were autonomous when they evaluated policy and then considered how they wanted to change their practice, which led to enactments or selective enactments. Alternatively teachers ignored policy. Teachers lacked autonomy when they perceived that policy had to be enacted, which superseded their professional judgements regarding the learning and attainment needs of their pupils. I have suggested that phase three should have been a time for teachers to be autonomous as the NS had been removed and for eight teachers this was the case. However 17 teachers lacked autonomy due to the statutory nature of the NC and their perceptions that their professional judgements were not relevant.

Molly's reference to her colleagues' struggles suggests that she wanted her school to be autonomous through the use of a scheme that all teachers accepted as a 'starting point'. Her intention appears to have been to facilitate the security of her colleagues' PCK in order for them to be able to teach the NC. On a contrasting note Molly suggested that teachers could be autonomous and adapt the scheme. Thus, school autonomy can include variances in teachers' enactments of a scheme in accordance with their PCK so long as there is a sense of collective acceptance of the scheme.

It is not surprising that the schools in my sample did not seem to be autonomous as the teachers' autonomy altered across the three phases. I suggest that school autonomy can bridge the gap between teachers' altering autonomy and the effect policy might have upon their practice. Teachers can collaborate and agree on their school calculation policy, which could then determine the approach they want to take in their responses to government policy. Schools' autonomy is paradoxical as a decision may be made by one person that affects all of the teachers, e.g. the mathematics coordinator purchases a mathematics scheme that colleagues are asked to use. If teachers are expected to agree with a decision that they were not involved in making their individual autonomy may be compromised.

8.4 Uses and limitations of the theoretical frameworks

I changed my theoretical frameworks while I was analysing my data (which I discuss in section 4.3). Hence there was a slight mis-match between my initial interview questions and my subsequent data analysis. As I progressed within my research I realised that while my initial research title and questions remained appropriate the theoretical framework of power was not encapsulating what I wanted to understand. I layered over policy enactment and social constructionism theory in order to better address my interest, which was what did teachers think and do in response to each policy phase?

Teachers constructed their understanding of their experiences when they spoke with me during their interviews. Their recollections and explanations as to how and why policy affected their mathematics teaching were then constructed by myself into themes. Using social constructionism theory as the lens through which I analysed my data enabled me to search for teachers' policy enactments and their professionalism within their responses. It was useful to consider responses in terms of how teachers positioned themselves, e.g. unable to resist policy in order to justify their accounts or maintain their credibility (Burr, 2015).

A limitation of social constructionism is that external realities are not recognised. However I accepted references to objective knowledge, for example when teachers spoke of preparing their pupils for the national tests. I recognised from my own experiences and the literature that teachers need their pupils to be ready and do well and are under pressure to meet the national

attainment targets. My research is also limited by my acceptance of teachers' perceptions of frustration or satisfaction (for example) that are external realities according to Liebrucks (2001).

I acknowledged professionalism as an external reality. I referred to the literature relating to professionalism that contains the characteristics of autonomy, professional development, professional knowledge and collaboration. I then drew on the literature to identify where teachers associated policy with their professionalism, for example professional development and the effect of this on their policy enactments. While I acknowledged these external realities I did not have a pre-determined framework that stated a model of professionalism and policy enactment.

Social constructionism theory enabled me to recognise how teachers' experiences and changes to their teaching position contributed to the construction of their policy enactments and their professionalism. I considered how teachers viewed their retrospective actions through the lens of their current teaching position, which Burr (2015: 3) refers to as 'historical and cultural specificity'. This was useful to an extent in enabling me to recognise how teachers reflections could (but did not always) alter according to their different responsibilities.

Kelchtermans (2005) points out that teachers' responses to policy relate to a time and place and will go on to affect their contemporary responses to policy. My limited data prevents me from concluding that teachers' experience and their teaching position affected their policy enactments. However I can tentatively conclude that teachers' social construction of their experiences was affected by the length of time teaching and/or the teaching position from which they made their reflections.

Turning my attention to policy enactment theory I analysed the teachers' responses in terms of what they considered as they interpreted and translated policy and what they did as they reconstructed and remade policy. The four stages of enactment aided me as I sought to recognise the teachers' considerations and/or actions in order to have explored their policy enactments.

I focussed in depth on recognising which part of the teachers' responses showed their interpretation, translation reconstruction or remaking of policy. I explored their perceptions of what the policy had meant to them and the tactics for their enactment, i.e. what the teachers

made of the policy. I also explored their perceptions of the parts of the policy they enacted and how they presented this within their practice i.e. what they did with the policy. For example, applying the lens of policy interpretation enabled me to see what teachers had taken into consideration as they made sense of policy, e.g. their current teaching position, their experience of teaching year six, the school context (e.g. being in the ISP). I sought connections between the teachers' responses and Ball, Maguire & Braun's (2012) theory of policy enactment.

It was useful to combine policy interpretation and translation due to my interview questions focussing on topic areas, which meant that teachers reflected upon what and how they had enacted policy throughout our conversation. Ball, Maguire & Braun (2012: 47) state that interpretation and translation of policy 'work together' as they are 'closely interwoven and overlapping'. Separating my findings in order to explore policy enactment as discrete stages would have been unhelpful as I would have been examining fragments of the teachers' responses and arguably my analysis and subsequent interpretations would therefore have been reductive. By maintaining the fullness of the teachers' responses I have been able to discuss their interpretations and translations of policy and I kept 'the flavour of the original data' (Cohen, Manion and Morrison, 2018: 647). Ball, Maguire & Braun's (2012) theory states that teachers' translation of policy, i.e. the putting of policy into practice can be influenced by SLT colleagues. Deanna's response (phase one) showed how she was part of others' translation of policy, rather than a recipient of a policy message, which adds an interesting development to the theory.

Ball, Maguire & Braun's (2012) theory arose from their focus as on three policies in situ at the same time whereas my study involved transitioning to policy phases. The implication of this was apparent in phase three when the PNS had been removed. I addressed this issue by referring to the policy situation however Ball, Maguire & Braun's (2012) policy enactment theory was not useful for my analysis. This is not a criticism of the theory, Ball, Maguire and Braun (2012) never intended to discuss how teachers manage following the removal of a previously enacted policy. However, it is a limitation of the theory. Meanwhile teachers' social construction of their professionalism became more relevant as teachers reflected on what it meant to be a professional post NS, particularly in terms of their PCK and autonomy. This difficulty eased when I analysed teachers' enactment of the NC which is a policy text.

8.5 Key limitations of my research study

I identified four key limitations of my research study, my bias, the omission of some teachers from a phase, the small sample size and my selective use of social constructionism theory. The following discussion shows my acknowledgement of the limitations and where possible the mitigating steps I took.

My bias was apparent from the outset of my research study. I presented my early findings from phase two at a conference in 2015 where I was asked if there had been any positive responses. As previously discussed the PNS affected me in a negative way and I initially expected the teachers' responses to resonate with my own. I designed my interview questions to elicit information about events that I considered important in terms of power, such as the introduction and removal of the PNS and the support teachers received. I empathised with teachers when I recognised we had experienced similar tensions. Maintaining a research diary and regularly distancing myself from the data analysis were effective in recognising my bias although clearly not sufficiently as evidenced by the question at the conference.

I undertook additional steps to reduce my bias, which included discussing my findings with my supervisors. They helped me recognise that I could not summarise each phase in just one way. Rather than focus on the gist of the responses that were negative I became better at recognising the nuances. My categories of useful, useful to an extent or not useful also broadened my analysis and helped to alleviate my bias. I analysed my data again several times and recognised a broader range of responses, including responses where teachers had found the PNS useful. I recognise that phases two and three contain more responses that suggested the policy, or the policy situation had not been useful than those for whom it had been useful (see table 8.3), which at the time of my analysis strengthened my bias. On reflection I recognise that the changes in policy from phase one onward became progressively less useful for teachers.

Table 8.3: A summary of the number of responses that suggested policy was useful, not useful or useful to some extent for each phase

Phase/Number of responses	Policy was useful	Policy was not useful	Policy was useful to some extent
Phase one	20	10	5

Phase two	9	19	5
Phase three	12	23	9

The table shows that there was double the number of responses that suggest policy in phase one was useful as opposed to not useful. In phases two and three there was a reversal of numbers as almost twice as many teachers spoke of policy not being useful rather than useful. Having analysed my data many times I consider my approach to have been rigorous and responsive to my bias.

The second limitation relates to the fact that I have not included all of the teachers from my sample within each phase, e.g. five teachers did not appear within my analysis of phases one and two and Hasnia did not appear in phase three. I selected the most common themes that addressed my research questions and I accepted that it was not possible to include every teacher. My selection process would have been more restrictive had I asked each teacher each interview question therefore I consider my use of interview topic areas to have been suitable. I recognise that across the three phases all 29 teachers are included.

Due to the small size of my sample I was limited in presenting my findings as a generalisation of all teachers in England. In addition, I included within my sample head teachers, mathematics coordinators, deputy head teachers and class teachers in an attempt to elicit contrasting responses from teachers with a range of different responsibilities. My findings show some differences in terms of perspectives, i.e. Holly's concern, as a head teacher, that the NC did not provide support for NQTs. However, most of the teachers' responses related to their experiences as classroom teachers. I suggest this was due to the lack of focus on the different teaching positions within my interview questions. In addition my purposive sampling focussed on teachers who had been in role since 2006. In hindsight I recognise that I could have approached a greater number of schools until I secured five head teachers who had been in post since 2006.

I recognise that the ontology of social constructionism could have yielded interesting responses had I explored the use of language within the teachers' responses. I could have analysed how they gained understanding based on their current PCK. What was it about their current PCK and the content of the NNS that led to an improved understanding and what language did teachers

use to signal their previous and updated understanding? I chose not to pursue this in order to maintain my focus on the effect of policy on teachers across the three phases.

8.6: The dissemination of my findings

I now consider how I shall disseminate my findings regarding teachers' responses to three policy phases. Although the three phases are in the past the issue of teachers responding to policy and the effect of their responses on their mathematics teaching is pertinent. While teachers will almost certainly continue to experience policy change they can be active in their responses. Therefore the dissemination of my findings will include submitting articles to reach a wide audience of readers. The Times Educational Supplement would be a useful format to publish an essay regarding the effect of policy changes on teachers' practice. I would also like my work to appear in peer-reviewed journals, e.g. the Journal of Education Policy. There could be three articles, each one focussed to the following topics that formed my conclusions:

- Professional development
- Policy, PCK and teachers' professional judgements
- Autonomy

I intend to present my findings at the Pedagogy, politics and teacher education international conference (May 2020) and BERA's annual conference (September 2020). I plan to let the head teachers and/or mathematics coordinators know that my thesis is complete. I will offer to meet with them to discuss the above mentioned topics.

8.7 Further research possibilities

As previously mentioned I was limited within this thesis to explore how teachers' different teaching positions may have affected their responses. I plan to revisit my data, drawing on theory related to teachers' experience, duties and responsibilities (e.g. Day and Gu, 2010, Burkhauser & Lesaux, 2017) to explore the effects of teachers as novices, veterans and leaders on their policy enactments and their mathematics teaching.

As the NC had only been in situ for a short while before I conducted my interviews, there was a limited time for teachers' enactment of this policy. Teachers have continued to teach the NC while I wrote this thesis. It would be interesting to revisit my sample schools to explore teachers'

responses to the NC five years after their initial responses (in 2020). I could create a longitudinal study and compare the responses from the data I collected in 2015. Within this research I could explore teachers' enactments of the mathematics schemes to examine connections and disconnections to their PCK. I could also interview ECTs to explore their responses to the ECF (DfE, 2019) and the effect of the framework on their perceptions of teaching mathematics. These research possibilities could develop my idea that teachers make connections or disconnections to policy and I could use a grounded theory approach.

8.8 My original contribution to knowledge

Teachers' PCK, professional judgements and autonomy were supported or shaken by changes to policy. The NNS had the greatest effect in terms of teachers finding policy useful due to its PCK content and provision of professional development. In phase two there was a greater number of teachers who had not found policy useful and I have shown how teachers struggled in their enactments of the PNS. This number increased again in phase three. Significantly, the responses to phase three did not suggest that the previous two phases had prepared teachers to teach for phase three. Teachers were expected to manage a new and very different NC without the need for accompanying professional development.

Policy can be a means of professional development. However teachers have varied professional development needs that cannot always be met by policy and its accompanying training events. The enhancements made to teachers' mathematics teaching were dependent on their capacity to recognise potential benefits to their practice. Teachers appear to have gained functional development from phases one and two that did not prepare them to manage the transition to the 2013 NC.

There is a complex relationship between teachers' PCK and their professional judgements. Teachers' level of security in their PCK affected their capacity to understand policy and affected their responses. They made connections to policy when they reviewed their current practice and perceived that their PCK could be updated and become secure. Alternatively, teachers combined their current, secure PCK with policy and updated their practice. Disconnections from policy occurred when teachers perceived that their PCK was secure and/or more relevant than policy. In phase three the teachers whose PCK was insecure (in terms of teaching without the PNS or

enacting the NC) sought a connection. Those who were secure in their PCK found this phase useful as they could draw on their own knowledge.

Teachers were autonomous when they adapted or ignored policy according to their professional judgements. When teachers felt that policy superseded their professional judgements they lacked autonomy. The idea of connections to or disconnections from policy acknowledges the overlap amongst policy, PCK and teachers' professional judgements. Their autonomy was paradoxical as it equated to whether teachers perceived that they could have adapted or ignored policy and the extent to which they could take action. These perceptions were affected by policy messages received (e.g. the PNS could lead schools out of the ISP).

8.9 Recommendations

My findings lead me to recommend that schools need to be autonomous regarding their responses to policy. This autonomy can incorporate a professional development programme that facilitates teachers becoming secure in their PCK so that they can manage significant policy change in the future. As a collaborative staff teachers can make sense of policy and collectively discuss and agree on their responses. Pressure to enact or a perception that policy is more relevant than teachers' professional judgements can be mitigated. Schools can decide on the approach that supports teachers' PCK and addresses the learning and attainment needs of their pupils within their interpretations of policy.

Schools could engage in lesson studies that include 'collaborative learning groups' in-house and with other schools as suggested by ACME (2016: 10). Teachers can take time to try out new ideas and evaluate their mathematics teaching. The professional development programme, collaborative environment and lesson study will need time and peer support, which needs to be recognised by policy writers. The idea of connections to and disconnections from policy should become obsolete as teachers continuously enhance their PCK. Teachers' professional judgements can be strengthened through the collaborative and supportive environment in which they work.

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Appendices

Appendix 1 – An example of my analysis

Tina's response includes interpretation, translation, reconstruction and remaking of the PNS. I focussed on small sections of Tina's response at a time in order to focus on how it showed each stage or a combination of stages. The following account consists of small sections of Tina's response followed by my explanation of how I identified the stage(s).

Tina: I feel that there is quite a lot of freedom, you know what you have to teach and it's up to you how to deliver that.

Interpretation of policy

Tina considered what the PNS meant to her, it suggested a sense of freedom to teach in the way she considered appropriate.

Remaking of policy

There was no 'accommodation of policy ideas' (Ball, Maguire and Braun, 2012: 113). Tina's 'freedom' suggests that the PNS facilitated her teaching in the way she considered appropriate.

Tina: I suppose you have to take into account the cohort, the type of children you have and what they would have been exposed to before in the school. And obviously we take into account guidance and the ethos that the children come up with, in terms of how we teach. We do have some guidance as to how to do it... in-house guidelines. This is what you do for mental starters, possible suggestions, but I just feel that as long as I am covering the Curriculum everything else is up to me.

Interpretation of policy

Policy has been recontextualised from the government produced Framework to the school's calculation policy and finally to Tina's classroom as she considered her pupil cohort. As she made sense of the PNS Tina placed greater importance on her school's calculation policy, resulting in her prioritising the school's calculation policy. Tina's policy biography (Ball, Maguire and Braun, 2012) included her missing the launch of the PNS and not having time to familiarise herself with the policy.

Translation of policy

The tactics of putting the policy into practice include Tina's consideration of the school's calculation policy that competed with the PNS.

Reconstruction of policy

Tina reviewed her practice, she selected what she considered appropriate from the school's calculation policy, while ignoring the PNS. Her knowledge of her pupils' learning and attainment needs informed her decisions.

Remaking of policy

Tina's consideration of the school's calculation policy as 'guidelines' or 'suggestions' shows her pragmatic approach to policy, i.e. that her practice determined her enactment.

Overlap of translation and reconstruction of policy

Tina drew on the school's calculation policy (a tactic of translation) and was affected by her 'understanding and pedagogy' as she reconstructed policy (Ball, Maguire and Braun, 2012: 111).

Overlap of reconstruction, translation and remaking of policy

Ignoring the PNS while considering the school's calculation policy (translation of policy) led to Tina's pragmatic approach, she prioritised her current practice over policy (remaking). At the reconstruction stage Tina was not considering the PNS, instead she considered the school's calculation policy.

Considering the four stages as non-chronological was helpful as the responses show that at times stages occurred simultaneously. Overlapping stages was helpful as I could explore Tina's responses without concerning myself with separating sections out to make them fit each stage and losing sight of the full response.

Appendix 2 – Interview questions

University of Roehampton London

Primary teachers' perceptions of their professional identities before, during and after the Primary National Strategy with regard to teaching mathematics

Professional Information

How long have you been teaching for?

What year groups have you taught?

Have you taught at other schools?

Historic Context

What is your recollection of how the PNS was launched?

Were you involved in the launch of the PNS into school and if so, how?

How did you feel about the strategy (NNS/PNS)?

How well do you believe the NNS/PNS addressed the current situation of mathematics teaching in your school/classroom?

What guidance did you receive from the National Strategy documentation and/or training events?

To what extent do you believe you followed this guidance? Were there any factors that influenced you here?

How supported did you feel in order to proceed with your mathematics teaching?

Repeat these questions and focus on local authority guidance (Inset, paperwork).

How closely do you believe you adhered to the guidelines of the PNS? Do you believe the children you taught made progress because of the PNS or your professional judgement?

How specific do you believe the policy was regarding:

- Mathematics subject knowledge?
- How and when mathematics should be taught?

How was your school mathematics/calculation policy created? What did you draw on for guidance?

Who was involved in creating the school mathematics/calculation policy?

Current Context

How do you feel about the PNS having been archived?

Do you believe your school mathematics/calculation policy has altered since 2011? If so, how?

How do you consider the removal of the Primary National Strategy has impacted upon your mathematics teaching?

How supported do you feel to teach mathematics at this current time? Is support important to you? Why/why not?

Teacher Autonomy

To what extent do you feel you have exercised autonomy in terms of teaching mathematics:

Pre PNS?

During the time of the PNS?

2011 onward, since the archiving of the PNS?

Do you expect education policy to be specific in its content regarding the teaching and learning of mathematics? Why/why not?

To what extent do you believe you should be involved and/or responsible for mathematics teaching and learning?

How far do you think your mathematical knowledge and understanding is conducive to teaching the subject well? Can a policy enhance your subject and pedagogic knowledge?

Appendix 3 – Summary of schools within my sample

Name of School (pseudonym)	Number of children on roll. Year groups included in school. Percentage of children: who have a special educational need (SEN) who have English as an additional language (EAL) who receive free school meals (FSM)	Characteristics of School
Kersley Primary	526 on role Nursery to Y6 7% SEN 24.8% EAL 17.3% FSM Source: http://www.education.gov.uk/schools/performance/ last accessed 30 March 2015	Just completed new build. Two form entry, with YR, Y1 and Y2 being three form entry. Ofsted rating good 2014.
Armstrong Primary	418 on role. Nursery to Y6 10.5% SEN 15.3% EAL 30.2% FSM	Been part of ISP. Deprived area of the borough. Put into special measures 2009. Out of special measures in 2011.

	Source http://www.education.gov.uk/schools/performance/ Last accessed 30 March 2015	Rated as good by Ofsted in 2013. Two form entry.
Pemberton Primary	589 on roll Nursery to Y6 5.6% SEN 27.3% EAL 24.4%FSM Source http://www.education.gov.uk/schools/performance/ Last accessed 18 November 2015	Ofsted rating good 2014. Deprived area. School was part of the intensive support programme. Three form entry.
Lethbridge Primary	330 on roll Nursery to Y6 10.6% SEN 24.9% EAL 48.4% FSM Source http://www.education.gov.uk/schools/performance/ last accessed 18 November 2015	Rated as good by Ofsted 2014. Deprived area. Bulge in years R and Y3, other years single form entry.
Bellingham Primary	347 on roll Nursery to Y6	Recently had new build. Class sizes average 35 children. Two

	7.5% SEN 26.8% EAL 6.8% FSM Source http://www.education.gov.uk/schools/performance/ last accessed 18 November 2015	form entry up until Y5, single form entry in Y6. Ofsted rating good 2015.

Appendix 4 – Extract of table of themes and all responses

This document is 38 pages long so an extract from phase one is included.

It was very structured as in week one you're going to do this and then you're going to do this and then you going to do this I probably didn't realise at the time that I could have been [autonomous] I think I just probably I just followed it religiously. So on day one it says this and therefore this is what I'm doing. Day two I need to spend 10 minutes on this and 20 minutes on this. But with my experience and knowledge and everything that wouldn't happen now so say the National Numeracy strategy was presented again it would be important to, I would then	At that time it would have been fine because I was still finding my feet, finding, I wasn't a confident teacher so I would have been okay this is what we have to do this is what we will do. This is how we will do it (Michelle). Initially I remember planning it just took forever. It was almost as long to plan it as it was to deliver it. This is just ridiculous, this isn't right (Maisie).	I felt we had more responsibility and you could be quite creative but possibly that was more difficult for people that didn't have knowledge (Tabitha). Things just seemed to change and different ways of working, different strategies of working out you know, multiplication, subtraction and addition. And ways in which the children had not become familiar with before. And the parents coming in all the time saying we don't know how this	Teachers' policy enactment brought about action and/or reflection on their current teaching practice

have a lot more background knowledge to know that I mustn't follow it explicitly that you take that as your foundation and you can also use it to inform whatever you need to do in your own classroom. But not follow it explicitly which is what people did (Harry). I think back and remember thinking it has to be 10 minutes it has to be 10 minutes because I suppose that's what they had said in all of the information that you were given. It was like stick to this rigidly and it will work your levels or standards will improve and so people were probably in fear that if		happens, so there were mammoth changes at that particular time (Tanya). They gave suggested approaches. I think that's what I was trying to get at and that was helpful, they suggested how to do it this way. At least then you knew you were on the right lines and you could tweak those as you saw fit (Tessa). I wasn't here when it was launched as I came as a supply to this school from South Africa in 2001. So whatever was given to me at the time is what I taught. It was very different to what I was familiar	

we don't do it exactly then it may not work so perhaps it was just that this is what it says so this is how it is. Sometimes when you take on interventions like we did reading recovery as an intervention and it was like no it has to be this way perhaps we are all OCD! Must do that 10 minutes 20 minutes half an hour plenary thing so it's probably because that is what is said and the autonomy of the class teacher knowing her class teacher knowing what this child needs and what that child me was taken away from them. Well no this is what everybody must do in the country you knew at 9 o'clock every morning there was a		with so that for me was a learning curve (Tahreem). There are certain constraints, that actually our numeracy coordinator and consultants and things like that, they were telling us that it had to be a certain way, and we were being picked up when it wasn't, that actually we just had to, like sheep, almost do as we were told (Taluja). I had worked for three years using the National Numeracy Strategy which I felt very secure with I had used that before when I was a University of four years so a good seven years at that (Dom).	

literacy hour going on in every single school and numeracy hour following and that's how it was. So people thought okay if I am going to be directed and told to do this then I will do it exactly as it says. Who knows? (Hasnia). I think the biggest problem with the National Curriculum when it first came in and I think that's still a big legacy that we've got nowadays was the fact that it was very very prescriptive. It had to be an hour a day it had to be broken down into those chunks. And then finishing off that 10 minute plenary at the end. I think that was the start of a		I felt safe that I was teaching the correct well not the correct thing but I was teaching to the level that I needed to teach to (Tessa). It was a lot of paper saying nothing. If that makes sense because they had all these things and I thought yes but what do I have to do? It spoke about differentiation but it wasn't given and so for someone like me who came from a system where there was no differentiation it was a learning curve for me. So how did I find it? I didn't enjoy it as I took it and then I had to go and find out more (Tahreem).	

very rigid form of lesson block that took many many many years for teachers to try and move a little bit away from (Holly). Autonomy before… I think we have been reined in by the national curriculum but perhaps we had more leeway then. Then when the numeracy strategy came in it was quite prescriptive (Heather). I had been trained and had used for a good few years the National Numeracy Strategy. Which for me at that time was very clear guidance and examples (Harry).		I think it was like the oral mental starters it was quite rigid and I felt that for four and five-year-olds it was quite an expectation (Dabria). I think just because they (NNS' unit plans) were so rigid and told you what to do and where I'm at the school that's what we were using at that time to teach maths (Tianna). The NNS was even more rigid in terms of timings (Tony). I didn't know about the unit plans really. We talked about them on placement and I had used one but I found them quite heavy going and I didn't really know about them so I found it quite hard to look at	

With the sort of examples that they gave you we could then pick out from them and use them directly within the classroom. I think it helped teachers who were not necessarily confident mathematicians to develop their own skills when they were teaching the children these skills. So looking at how maths is actually broken down and reasons why you do certain things with numbers that may be we weren't taught (Holly).		an objective and know how to teach it or what activities to do (Tallula). I think we had a very tricky planning format at the time. Trying to organise that at the time. The planning of it all was actually far more difficult than the teaching, imparting all that information across to the children and their learning. It was really the planning, there was just so much to get your head round (Tanya). I didn't like the unit plans anyway because it was just too much in one go like a week's plan would normally last about three weeks or longer you know one day would	

		never be a day it would always be two or three days (Tara). I remember they brought out the CD-ROM unit plans and I know that you had to adapt them but it was brilliant because it actually had the great ideas and it told you what it was expecting you to come out with the outcomes and stuff (Tracey). I do remember the maths adviser at the time came in the maths adviser was the person who presented five days training so yes it was incredibly thorough (Terry).	

I remember teaching from the NNS and thinking I liked the folder and how it opened for the more able you almost had year one and two on a page and you could use it for your differentiation (Hannah). I do think there were elements of it that were very good like I said the folder actually made them think about parts of their lesson and the balance between teacher talk and children's activities (Hannah). I remember teaching from the NNS and thinking I liked the folder (Hannah).	To make sure that all teachers are clear particularly with fractions of almost the stages of progression through the teaching of fractions because if that isn't followed and I would say in the NNS that was quite clear (Meena). I felt that the needs of the children were being met through the National Strategy that we had, you know the blue folder – the NNS, I felt was addressing their needs in as much as it was set out what they needed to know, and how to progress from one step to another (Molly).	I remember that you were so time focussed that it has got to be 10 minutes I don't know if you were always listening to what the children were saying because it was like let's get the next thing ready because we've got to move on especially as we had lots of games and the mental oral starters were things like passing a teddy bear around counting in twos and so on and I don't know if I was always listening to their chanting in twos because I was looking at the clock to think whether or not I had to move on (Dabria).	Ways that the NNS affected teachers' mathematics teaching

I think it (policy) is important and it should support teachers' subject knowledge which I felt personally the National Numeracy Strategy although it was a long time ago did (Harry). I did like that because I remember clearly learning long addition for example and long multiplication and I was just told lay your numbers out in the right place and then you do that and you get the right answer. Cross the number out, borrow it even now at my age as I'm doing it I think I do that, I borrow from the next number. I		And I mean pre-PNS I think I liked the old strategies that was the blue folder the NNS I loved that and I still even now direct people back to it because you can see where the children have come from and where you're going to (Daisy). I think the whole sort of glossary that came with it where it set out for each year group what a bar chart looked like and what I do think that sometimes when people question you you just give that back to them and I think that there was an element of support for the class-based teacher (Danica).	

say that in my head as I'm doing the sum on the paper. What I liked about the national [numeracy strategy] it was breaking it down and understanding what is happening to the number I can't tell you how old I was when I when oh is that what happens? And I love doing I do like maths. It just made perfect sense. I learnt a lot about doing it that way (Hasnia). The numeracy strategy, the blue folder I thought that supported people who didn't have a full		The numeracy strategy came out and then the unit plans came out which again I felt was very prescribed and using them, although they did say all over them this is not your planning, this is something you have to adapt for your class, but unfortunately they presented it as a weekly plan and so as maths coordinator in my last school I found that people thought "oh I have done my planning because I've got this sheet." I fell into that trap myself because I thought it looked good and you never look at it in enough depth so again that was there. As maths coordinator I threw all of the	

maths knowledge. But only that one really (Heather).		folders into a black sack after a while and told the teachers that they mustn't use them because it wasn't working, we were ending up with real gaps in the teaching. But then I used to find copies of them on the printer because they were downloading them anyway (Deanna). The old NNS there were lots of different types of calculation that they expected you to move through quite not quickly but then there's different levels I'm thinking of division when they were teaching number lines and then the chunking method which I really	

		liked although I know lots of people hated but I didn't I thought it was the next step from the number line but anyway that seems to have gone by the by because I don't think teachers did understand it (Deanna). With subject knowledge I think I kept referring back to the National Numerous Strategy. I felt that that was the document that supported me more (Dom). I find that really useful having a step-by-step instruction for each strategy. And I suppose the old	

		numeracy strategy probably did that (Tallula). I liked the way the numeracy hour worked I felt that I knew I had my 10 minutes, 40 minutes and 10 minutes. I liked the resources I thought they were pretty comprehensive (Taluja). The thing that sticks in my mind is the vocabulary book which you could just look to see ok I'm in year one, these are the vocabulary and things like that which I found was really useful (Taluja).	

		I pulled out good points from the numeracy strategy. The examples, they were very good and gave us something to refer back to. We were quite happy to work with it in the ways we wanted to work (Tanya). I think it gave you more flexibility in terms of that you were able to you could deviate from chunking but then go back to it do you see what I mean? I didn't feel that I had to stick with chunking and do it until the kids knew it whereas I could go and teach the roundabout route of chunking almost and then come back to it and say well now you	

		know that this is how we do it and fit it in to the chunking system or the chunking method rather so I did feel that there was a bit more flexibility for subject knowledge and I could teach it in a roundabout way just so then my kids would understand it and then come back to it so they would understand it a bit better (Tara). You had this is your ten minutes, this is your twenty minutes, this is the half an hour. I liked the structure and I liked that the children knew there would be this much of a mental oral, then it would be the teacher bit and then we would have a go and then we	

		would come back and review (Tasha). I did like it because it gave you ideas and you could either take the idea or you could just take the objective as long as the outcomes were similar then you could just run away with it and in some ways it was quite nice to be told how to do it and you can change it because you know sometimes you get carried away with things and you actually lose the whole point of the lesson because you got so excited with the activities you want to be doing so it kept me quite focussed (Tasha).	

		I think we had a vocabulary booklet I remember that and it was really useful because it outlined the progression in vocabulary throughout the year groups and what you needed. I mean you can get all that on the Internet you know you can Google that but you wanted something that was you know like the law to tell you that this is what you are supposed to be cover so that it was clear to you (Tessa). It gave me the guidance to do that and then I could use the different material or different questioning from my own knowledge my own experience the like I said someone as young and new they need	

		something to go by I think that just helps them (Tessa). The original one from 1999 the Numeracy Strategy I thought was fantastic. I like something solid that I could see the progression through that (Tracey). I sometimes think that people as a teacher why not use those things I remember some people saying I want to come up with my own ideas and I think well if these are really good ideas why not use them? (Tracey).	

		I liked the fact it had a little clock it told you how to break it down into really small steps of how many minutes each thing should be and exactly what you should be teaching and I really liked that I was really confident as a teacher using the national numeracy strategy (Tricia).	

Appendix 5 – Extracts from two transcripts

Tara's transcript

Tara works in Pemberton school, the third school in which I conducted my interviews.

LP: so first of all can you just tell me a little but about yourself, how long you've been teaching if you've worked in any other schools and the year groups you've taught?

Tara: I have been teaching for about 10 or 11 years. I've taught in key stage two predominantly in years four five and six and this is my second school that I have been working in so I was at my first school for about six years before taking a bit of a break for kids and now I'm here.

LP: okay so you've mentioned earlier that you have had a four-year gap that was before you came to this school?

Tara: yes.

LP: okay thank you. So what's your recollection of how the PNS was launched?

Tara: I remember the primary no the National Numeracy Strategy with the unit plans and then that got taken away and what was brought in was the Primary National Strategy. I don't remember hugely how it was launched but I do remember the differences. I remember the fact it was unit plans for maths which turned into blocks which we had a bit more freedom in how to teach or what to teach when type thing. But I don't really have much recollection of how it was launched I can't remember.

LP: okay that's fair enough sometimes that's quite telling in itself isn't it?

Tara: yes.

LP: do you remember having any training in your school?

Tara: I know that we had in-house and INSET and staff meetings with the coordinator would lead the meeting or the head teacher or the deputy would do the meetings and we would find out from there but I was never sent out for any training at all.

LP: so were you involved in any level at school level? Or in the launch to anybody else? And do you remember if your school calculation policy changed?

Tara: going from way back when I was training to be a teacher there was a lot of new things that I hadn't even learnt in maths like that I didn't know myself like the chunking method all that was new so when I had my training I was learning all of those new things to begin with and then when teaching it I found that I finally got the hang of it and I was teaching at so that was new to me the calculation policy. I didn't have a hand in, anything that was written in it but we were just told this is how it's meant to be and that's how I taught it.

LP: and how did you feel about that? Being told?

Tara: to be honest I mean I ran with it I did it because that's what we do and because it wasn't the way that I had been used to even when growing up myself I found it difficult to be able to teach it sometimes.

LP: that's really interesting. Do you feel that you took what you wanted from it after a while? So you bought into it wholesale as you say as that's what we did and did you find that you made adaptations?

Tara: yes I mean every plan needs it doesn't it? So we did tweak it and it was a huge jump from the unit plans to the blocks. I didn't like the unit plans anyway because it was just too much in one go like a week's plan would normally last about three weeks or longer you know one day would never be a day it would always be two or three days. So getting rid of the unit plans was a plus for me and then having the blocks meant that yes we could plan and use those and teach it in a timescale better for us because like I say the unit plans were too much information in one go. So I did feel that it was better with the blocks and I was able to pick out from there and how long it was going to take to teach it and I could judge that rather than the unit plans that were telling me that this is going to take a week and it took three. That was too much.

LP: thank you that's very interesting. So how well do you believe it addressed the current situation of maths in your school and/or classroom?

Tara: well like I say the fact it was like maths was very stressful like you had to teach it, it was a lot easier with the blocks as you were able to judge yourself of your class or year group actually this

unit or this block will take this long to teach. And you could judge that. There was a block which the plan said would take four weeks that may only take three weeks and therefore you could tweak it like that and it wouldn't be so bad, that's what I liked about it the fact that there was a little bit more flexibility with it. I mean I know you still had to follow it to the point where you couldn't go way out of sync but I did feel that it was a little more flexible.

LP: and do you think when you say it might have taken less or more time than it proposed is that because of the pitch do you think all because of your cohort of children?

Tara: both really because depending on the cohort of children I know I remember having children that were really needy and so I could have spent longer on it but there were times when I could say well actually we are going to spend an extra day honest and it's going to be okay whereas if I had done that previously I would have been way behind. But I didn't feel like I was way behind if then I needed an extra day.

LP: right okay. Because your children were getting what they needed?

Tara: yes exactly.

Dom's transcript

I interviewed Dom in Armstrong the second school in which I conducted my interviews.

LP: did you have a chance to look at the questions?

Dom: I did yes. I looked at them, I didn't prepare anything though. I did look through them.

LP: that's fine, did you find that by looking through them you had a little more memory?

Dom: a little bit more yes.

LP: because my concern is that I would ask somebody of question from 2006 and they would think gosh that's a long time ago.

Dom: yes it is a long time ago.

LP: did you speak to other people about the questions or did you just reflect for yourself?

Dom: just reflected myself really.

LP: okay lovely thank you. So just to remind you why I am here is part of my Ph.D. The reason I'm investigating the Primary National Strategy is because of my experience with it. I was told here you are here is your box of tricks it's going to solve all of our problems and we will all teach maths very well and the children will make progress. The children weren't making progress and so I started to question that. And now I'm teacher training and I see how some people feel about maths and I wonder how far can a policy go? To teach maths well and that's what I want to find out from you. So what's your recollection of how the PNS was launched?

Dom: I was working in another school at the time. No sorry in 2006 I was just at the end of my time at my first school actually. So I don't have a great recollection of exactly how it was launched until I got to this local authority. So in the other borough that I worked in I don't remember very much about that. But when I got to this local authority which I think is a borough where there is a lot of support from the local authority there was a degree of guidance with it. More than I had had previously.

LP: were you in your previous school in 2006?

Dom: yes. I'm just thinking I joined this school in 2007.

LP: okay and that was your first school within this local authority?

Dom: yes.

LP: so once you went where you were very aware of the PNS but other than that it had just slid in had it? Without you noticing?

Dom: I can't seem to remember coming across it really prior to that no.

LP: that's so interesting isn't it?

Dom: yes.

LP: so obviously you weren't involved in any launch of the PNS into your previous school?

Dom: no.

LP: how did you feel about it? Once you went to school in this area and you realised it was in existence and you said the support was good, how did you feel about the PNS?

Dom: so just to make sure I'm talking along the right lines we've got the National Numeracy Strategy and then we had the PNS after that?

LP: yes.

Dom: well I personally felt that it wasn't as good as the National Numeracy Strategy. I thought it was a simpler document. You know strategy to follow. When I had worked for three years using the National Numeracy Strategy which I felt very secure with I had used that before when I was a University of four years so a good seven years at that. I did feel that it was a very useful document and support so I'll be entirely honest I don't think I referred to I don't think and I was teaching in year five and Dom: so and that's kind of the year groups I've always taught again so I probably didn't refer to the document loads and loads. Because I knew what I needed wanted to teach I knew how I needed to teach it I would refer to it for planning just to make sure that we are covering everything but if I then saw something I would then use my own experiences of how I'm going to tackle that objective. How I'm going to work my way through it.

Appendix 6 – Ethical considerations

The research for this project was submitted for ethics consideration under the reference EDU 14/072 in the Department of Education and was approved under the procedures of the University of Roehampton's Ethics Committee on 12 August 2014.

ETHICS

APPLICATION FORM

(Staff and Research Students)

(March 2014)

PLEASE CHECK THE RELEVANT BOX	
(NB. double click on the check box and select 'checked')	
MEMBER OF STAFF ☒	RESEARCH STUDENT ☒ (MPhil, PhD, EdD, PsychD)
EXTERNAL INVESTIGATOR ☐	STUDENT (Other)** ☐

*If you are a transfer student or conducting collaborative research you may not need to complete this form: please see Section 2.2. of the Guidelines. **If you are on a taught course you do not need to complete this form unless your project is worth more than 50% of your total credits or you have been asked to do so by your supervisor*

SECTION 1: PERSONAL DETAILS

Please complete the header with your name and Department

Name (lead):	Evelyn Penfold
Other investigators:	N/A
Correspondence address:	
Telephone no:	
Email:*(all correspondence will be sent by email unless otherwise requested)*	Evelyn.penfold@roehampton.ac.uk
FOR STUDENTS ONLY:	
Programme of Study & Department:	MPhil/PhD Education
Mode of study (full-time/part-time)	Part time
Director of Studies & Supervisor: (If you are on a taught course please just give the name of your supervisor)	Director of Studies: Dr Sue Gifford Supervisor: Dr Kate Hoskins
FOR EXTERNAL INVESTIGATORS ONLY (please see Section 4.5 of the Ethical Guidelines):	
Name of Academic Assessor:	
SECTION 2: PROJECT DETAILS	

Title of project:	An Investigation into the Extent that Policy can Determine the Teaching of Primary Mathematics
Proposed start date: *Please note that approval can take some time. Please submit applications in a timely manner. Reasons should be given for late or retrospective submissions in order to secure approval.*	July 2014: Pilot data collection January 2015: Data collection *(Applications should only be submitted retrospectively in exceptional circumstances. These will require the approval of the Chair of the Ethics Committee).*
Duration:	Pilot study and data analysis 6 months Data collection 12 months

Purpose of the proposed investigation:

This section should include the material which concisely outlines the rationale for the project, i.e. why this study needs to be done. This should be done in a way that is both accessible and scholarly, i.e. have proper cited sources.

I intend to investigate how primary teachers, (i) teaching children between the age of 3-11, recall responding to the Primary National Strategy (PNS) (DfES, 2006) and since its removal from current policy (DfE, 2011). This investigation will include teachers' beliefs regarding the level of support available to them from their local authority and school. Head teachers and teachers receive policy directives from the government, one of which was the PNS, introduced in 2006.

I am undertaking this research because I want to explore teachers' recall of the emotional response to receiving the PNS. It will be interesting to know how they believe the PNS impacted upon their teaching and their sense of professional autonomy. This study will contribute to the

'creative tension' research produces (BERA, 2011: 4) and is aimed towards revealing how teachers feel about policy in gain a sense of implications for future policy initiatives.

The PNS was part of the National Strategies programme, which was designed to raise standards (DfES, 2006) and stipulated objectives, worked examples and a schedule of lessons to follow. This level of prescriptiveness (Brown, 2010) was implemented by the government in 2001, when national test results failed to 'rise significantly' and the blame was laid at the hands of teachers as they could not have been following the guidance faithfully (Brown, 2010).

It is relevant to note that *strategy* refers to a 'professional development programme' with training and support provided to achieve the document's objectives (DfE, 2011). Thus the PNS was a strategic policy document, which is significant as it encompasses training and support (DfE, 2011) to facilitate a school setting adapting their policy in order to implement government directives, according to Bell & Stevenson (2006).

I will conduct the research using the theoretical framework of Foucault's (1969) notion of knowledge and power as well as Scott's (2000) theory of individual agency. It is of interest to ascertain whether these professionals believe they have been rendered as merely 'skilled technicians' who deliver the content of the strategic documents (Codd, 2005: 202). Undertaking the research through this theoretical lens will aid my exploration of whether teachers believe they needed a strategic policy directive and to what extent they consider structured guidance is necessary.

I want to ascertain from teachers the level of support they believe the PNS provided them in terms of their pedagogic and subject knowledge and their beliefs regarding the role of both national and school policy. I want to know whether teachers believed they were empowered to improve their teaching practice or felt undermined by the PNS guidance. As there is no current policy regarding mathematics teaching, I want to explore what teachers believe their current position to be.

By undertaking this research study I will raise questions about who teachers believe should create policy in order to develop guidelines for future policy makers. I will present my findings in terms of whose responsibility it is to ensure our primary teachers are competent and confident in teaching mathematics, which may influence future initial teacher education programmes.

Through questioning the level of national and local support teachers believe they received when the PNS was launched I will offer the opportunity for a small cohort to voice their response to policy discourse. By presenting teachers' opinions regarding the level and extent of support that they consider reasonable I shall make tentative suggestions regarding strategic policy directives. As national policy has not been in place since 2011 and I will be exploring teachers' responses to this, I will be contributing knowledge to an era that is contemporary and has not as yet been researched in great depth.

Outline of the project:

This section should include the details of the methods i.e. what will be done and how.

I have selected a qualitative research methodology for my study as it concerns itself with human behaviour, within a social context (Henn, Weinstein and Foard, 2009). This methodology enables me to explore through dialogue 'issues that lie beneath the surface of presenting behaviours and actions (Cohen, Manion & Morrison, 2011: 219). As Henn, Weinstein and Foard (2009: 175) state, I will develop an appreciation of the participants' 'underlying motivations'. Using a qualitative methodology provides me with a forum to 'interpret phenomena in terms of the meanings people bring to them' (Denzin & Lincoln, 2011: 3).

The qualitative approach places me as a social actor within my research study, according to Cohen, Manion & Morrison (2011); within the interviews I will record my responses, which will form part of the data. Flick (2010:16) contends that these sorts of reflections are valid as an 'explicit part of knowledge' that enhances the element of subjectivity. I will monitor and record my responses which will acknowledge how my contributions affect the participants' responses, along with my interpretation.

The method of data collection is semi-structured individual interviews with teachers, mathematics coordinators and head teachers. By undertaking semi-structured interviews I will have the flexibility to pursue pertinent points the teachers raise (Bryman, 2012). I will also allow the direction of the interview to alter, should a participant make a pertinent point (Gray, 2009).

I am aware that participants may have their own bias, which will be unrelated to the boundaries of my research. In order for my research study to be valid, Mason (2002: 188) urges that I should ensure that my data measure or explain 'what [I] claim to be measuring or explaining'. Therefore, superfluous or irrelevant data must be excluded from the data collection processes. I shall do this by asking a question that prompts the participant back to the topic, or refer them to their sketch and ask them to discuss an aspect.

I aim to invite participants to create a sketch that shows their path from receiving the PNS to the present date. As Newby (2010) advocates, sketches facilitate recall and assist verbalisation. The sketches will be discussed in situ and I will incorporate my questions and prompt participants throughout. An advantage of this method is that participants may introduce a theme that is not covered by my interview questions yet is valuable and can be pursued, according to Newby (2010). This method offers a creative alternative to a purely talked through interview, according to Mason (2002).

Teachers' responses to the usage and subsequent archiving of the PNS are essential within my study; their stories may indicate their sense of autonomy (Scott, 2000) and their belief of their reaction to policy. There cannot be any sense of presumed responses; indeed I welcome Trowler's (2003) notion of the unpredictable nature of results as I reveal the notion of humanity within the perspective of policy.

I shall conduct semi-structured individual interviews within four (five was previously written in error) mainstream primary schools in order to have a sufficiently sized sample group. Within each school, participants will include the head teacher, mathematics coordinator and a number of teachers that bring the sample total to thirty participants, as recommended by (Cohen, Manion & Morrison, 2011). The pilot study will take place in a separate school and the data will be used within the full study. The pilot study will include four participants, the head teacher, mathematics coordinator and two teachers.

(iii) The interviews will take place in a quiet area of the school, which may be a classroom. It is important that the participants are not disturbed, therefore the staff room is not considered appropriate. I shall request a room that is close to the head teacher's office or the school office to

facilitate being in a populated part of the school. It is anticipated the interviews will last for 30-40 minutes.

The schools are within the same local authority, within a London borough, which is the borough that I taught in and where I live. The fact that I have experience of working within the local authority affects my position as researcher as I may take for granted how the local authority operates. I will ensure that my questions related to the local authority are neutral and will take steps to avoid telling participants of my previous experience. The reason that the schools are within the same borough is convenience (Cohen, Manion & Morrison, 2011), I am known to three head teachers through my professional role of School Experience Tutor. I have also requested access from colleagues who have worked on secondment from two other schools, which coincidentally are in the same local authority.

For both the pilot and full study, participants will be asked to volunteer. I shall visit schools to introduce my research study, emphasising to the head teacher the significance of the involvement of the mathematics coordinator and themselves agreeing to participate. I will request from head teachers the opportunity to attend a staff meeting in order to inform teachers of the research and ask for participants. (ii) At this stage I shall also ask the head teacher to sign a consent form that permits me to conduct my research in their school, recruiting their staff to participate.

I will provide an interview pack with Government produced literature regarding the PNS to facilitate participants' memory of the strategies. The intention of providing only Government produced material is to indicate to participants that it is policy we will be discussing and to avoid displaying bias, which could occur if I were to create my own materials (Cohen, Manion & Morrison, 2011). A copy of the initial interview questions will also be provided to prepare participants for the verbal semi-structured interview.

The interviews will be audio recorded and participants will be advised that the digital recording file and subsequent transcripts will be password protected on a personal laptop and USB, as recommended by Cohen, Manion & Morrison (2011). I will offer participants the opportunity of viewing the interview transcript and data analysis for them to check that they have been accurately represented, as recommended by Cohen, Manion & Morrison (2011).

Outline of the project (continued): Please continue on extra sheets if necessary.
Ethical issues raised by the project and how these will be addressed: (Points that should be considered include: participants and consent; permissions from organisations involved; confidentiality and anonymity; whether any inclusion/exclusion criteria or special/ vulnerable populations are involved (including under 18s); right to withdrawal; deception; potential risks to participants or researchers)
I am considering a sample group with a maximum of thirty participants to avoid having superfluous data, as recommended by Cohen, Manion & Morrison (2011). I do not want to have to disregard data because the volume is untenable and potentially repetitive. Within this figure, it is important that the head teacher and mathematics coordinator from each school is included because they are leading the school or the subject and their perspective may be different to class teachers. This provides an element of flexibility regarding how the maximum of twenty two participants is collated. If a school has a small number of teachers that wish to participate it can still be included as a different school may have a greater number. It is not necessary for the participants to have worked at their current school between 2005/2006 and the present date, although it is imperative that they have been teaching from this time in order to have experience of the PNS. This may limit the number of potential participants, particularly from a school with a small staff, however it is not crucial to the study that each school has a minimum or equal number of participants. To counter the possibility of having too many teachers as participants, I shall ask for a maximum of seven from each school. Should I obtain the maximum, there will be a surplus, which could become contingent, should participants withdraw from the study (Newby, 2010). Participants will be accepted in the order they apply, therefore it may be necessary to say no to some if I have obtained the maximum number.

According to Scott (2000), there is a power dynamic involved within the selection process as the head teacher may wish to influence who participates. I aim to avoid this by reassuring head teachers that my research involves individuals' personal recall and at no time will I be judging the school in terms of league tables, observing teaching or looking at planning.

Power also operates within the interview process, generated by my agenda and questioning (Creswell, 2013). I will adhere to Henn, Weinstein and Foard's (2009) recommendation of developing a mutual relationship to reduce the notion of my role as researcher having power over the participant. Using Mason's (2002) suggestion of asking participants to create a sketch places them in the position of leading the conversation will restore some of this power. I do however have an agenda, which directs my study and therefore I need to intervene when necessary in order to gain answers to my research questions (Creswell, 2013). Should I become aware of participants showing signs of discomfort I will remind them of their right not to answer (BERA, 2011).

I recognise that my current role as Senior Lecturer in Primary Mathematics Education may add an additional element of power to the research study. As a researcher I am in a position of power over the participants, as they will be placed in a normalizing situation, where they adjust their behaviour because they consider judgement is being made of them (Scott, 2000a). Some of the participants will know me from previous professional meetings relating to a student who has been placed in their class. It is possible that I will work with the teacher in this capacity again, following the interview, which could affect the participants' responses if they feel I will judge them or refer back to the interview at a subsequent non-research working relationship. I will reassure those involved that the research is a separate entity, removed from school supervision and there will be no cross-referencing.

Head teachers and/or the chairperson of the governing body are expected to be the gatekeepers for this research study (Cohen, Manion & Morrison, 2011: 81). As Bryman (2012:151) notes, 'gatekeepers […] are concerned about the researcher's motives: what the organisation can gain from the investigation, what it will lose by participating in the research in terms of staff time and other costs, and potential risks to its image'. An initial conversation outlining my research study

has taken place with three head teachers and two teachers from prospective schools. I will repeat this closer to the start date of the interviews advising them of the minimal risks to enable them to make an informed decision regarding their school's involvement.

They will be informed as to the purpose of my research and why I have selected them for the study. In accordance with BERA's ethical guidelines (2011) head teachers will be informed that the data obtained will be used to assess the intention and utility of my interview questions as well as the conduct of the interview itself. The data obtained from the pilot interviews will be used within the final research study and the participants will be informed of this. The pilot study will enable me to reflect upon my role within the interviews and inform the modification of questions. I shall identify themes and categories and consider how applicable these are in answering my research questions (Cohen, Manion & Morrison, 2011).

Head teachers may be concerned that a colleague could disclose potentially damaging revelations regarding conduct within their school. In order to reduce the opportunity for this to happen my research questions include reference to policy documents, large organisations such as the government and local authorities. There is no indication within my questions of a desire to name individuals or school specific events, positively or negatively.

It is anticipated that head teachers may be keen to benefit from the chance to present their version of events, through self-advertisement. If this should occur during the interview I aim to ask a refocussing question and explain why I will not pursue a line that does not relate to my research questions. During respondent validation, a head teacher may reiterate or introduce a point that they wish to have included. I would have to maintain my stance, as the alternative is to allow data that is not closely aligned to my study, potentially compromising its overall validity (Newby 2010). As the head teacher will be the gatekeeper it is important that I explain the role and purpose of the study sufficiently in order to facilitate consideration of the risks and acknowledging that s/he cannot influence the study's findings.

I intend to alleviate issues relating to staff being available by being flexible with interview times within the hours of 8am-5pm. Should the head teacher and/or a participant have concerns regarding undertaking interviews within the lunch hour, I will avoid this. I will ask the head

teacher, as the gate keeper, whether there is a concern regarding a teacher requesting their interview during their planning, preparation and assessment time. If necessary I can make multiple visits to schools in order to facilitate the head teacher and participants' availability.

Anonymity within the data analysis and final thesis will be maintained, in accordance with the University's Ethics Guidelines (2011) with pseudonyms being given to participants. Within the thesis pseudonyms will be used that identify a participant to their role, such as Harry (head teacher), Mark (maths coordinator) and Tina (teacher).

Within the data collection, the head teacher and mathematics coordinators' anonymity cannot be assured as their participation is a requirement of my study. Staff in school may be aware of this and they may see me interviewing their colleagues. When the data is presented in my thesis anonymity will be provided through the use of the above-mentioned pseudonyms.

When I arrange the interviews I shall provide individual schedules of appointment times in my attempt to avoid revealing the names of other participants. Again, staff may see a colleague being interviewed therefore I cannot guarantee anonymity at this stage. It is not a pre-requisite that participants take steps to avoid disclosing their involvement.

The head teacher will not be informed of which teachers are participants. A pre-requisite within the participant consent form will secure an understanding from all participants that I will not disclose their names. The intention behind this is to avoid head teachers wanting to know their staff's opinions in order to promote transparency within my study from the outset. The head teacher may be concerned about damaging revelations regarding their school and with this in mind try to influence the participants who are chosen for interview. I will assure the head teacher that the responses I seek relate to the participant's individual experiences. This does not guarantee that a participant will not mention a colleague, however if they do, it is their response that is of interest and not the name, position or action of others. The head teacher will be the first participant and will have experienced the questions I shall ask, therefore they will be able to judge for themselves how potentially damaging the interview may be. The pilot study will inform me as to questions that need to be re-written to reduce the potential for damaging revelations.

Should a head teacher ask for the names of participants I shall remind them of the participant consent form and that selection is not based upon any criteria. Obviously the head teacher will know that the mathematics coordinator will be involved and may deduce which teachers are relevant to the study in terms of the requirement of being in post since 2006. These deductions will not be confirmed and as there will be five mathematics coordinators involved, the risk of an individual being identified is reduced. The agreements I have received thus far have not included any stipulations regarding who is selected for interview.

In accordance with the University's Ethics Guidelines (2011), participants will be advised that they can withdraw from the study at any time. This information is evident within the participant consent form. Should a participant withdraw I shall comply with the University's ethics guidelines (2011) and still use their data within the analysis, albeit in an aggregated forum.

SECTION 3: USE OF PARTICIPANTS

- You should download the Participant Consent Form template and amend it as necessary
- You should also attach any other information to be given to participants
- You should consider carefully what information you provide to participants, e.g. scope of study, number of participants, duration of study, risks/benefits of the project. It is recommended that the participant has two copies of the consent form so they can retain one for information.
- If images or anything else which might allow the identification of participants is to be publicly accessible (e.g. on the web), further written consent must be secured. A separate section regarding this should be included on the participant consent form.

Give details of the method of recruitment, and potential benefits or incentives to participants if any (include any financial benefits where appropriate).

(NB: Please remember that written permission – or in some cases ethics approval – will have to be sought from any organisations where recruitment is carried out or posters placed (e.g. if you recruit in GP's surgeries you will require NHS approval)

I have introduced myself to three head teachers and obtained verbal permission to conduct my research in their school. For the remaining two schools I have consulted with the head teacher through a third party and gained permission. These preliminary conversations have briefly addressed my area of interest and the need to interview head teachers, mathematics coordinators and teachers. The next step is to visit each school in person and introduce myself and fully explain my research to the teaching staff in accordance with the University's Ethics Guidelines (2011). There will be a time implication of visiting five schools' staff meetings in terms of their availability and my commitments. I consider allowing this time as crucial to secure the goodwill of participants.

At the staff meeting I shall ask for volunteers and will leave my contact details. I will request e-mail responses that include convenient days and times for interviews and remind prospective participants that the first seven responses will be accepted. My confirmation e-mail will include the participant consent form with a request for this to be returned as an attachment. By allowing time for participants to approach me, I will ensure they do not feel pressured to commit during the initial meeting, as suggested by Creswell (2013). A paper copy of the participant consent form will be given when I meet with the participant in person and they can retain for their information.

I shall schedule the interviews with the head teacher and mathematics coordinator before the teachers and on the day the interviews take place, which will be when I collect the participant consent forms.

Participants will gain a sense of empowerment as they analyse their experiences, according to Newby (2010). Having the time to reflect upon their practice and consider their feelings is a further benefit to participants.

Will you be using participants who are aged under 18?

YES ☐ NO ☒

Will you be using participants who might be considered to be vulnerable (please give details if not addressed elsewhere on this form)?

YES ☐ NO ☒

If you have answered Yes please refer to the Ethics Guidelines (especially section 4.11 if involving participants who are aged under 18) and highlight the particular issues raised by working with these participants and how these issues have been addressed.

Details of DBS check (date and disclosure number)

Please note: if you are unsure whether this is required, please check with Helen Joyes (HR Officer, Operations) and advise us accordingly

SECTION 4: HEALTH AND SAFETY

- **You must download and complete the Ethics Risk Assessment Form (and Overseas Background Information Form if applicable) and attach this to your application.**
- You should be able to demonstrate that appropriate mechanisms are in place for the research to be carried out safely
- If necessary the Head of Health & Safety should be consulted before the application is submitted

Please give a brief overview of the main risks involved in the project and what will be done to mitigate against these.

The main risks relate to me traveling and working alone within the schools. These risks will be mitigated by taking due care and attention while driving and walking to and from schools. I shall

advise my director of studies and/or supervisor of the times of interviews and will make contact with them as I arrive and leave each school. The interviews will take place on school premises between 8am and 5pm. It is unlikely that I shall be alone with one other person; however should this occur I will update my director of studies and/or supervisor.

To minimise the risk of being isolated in a remote area of the school, I shall request that the interviews take place in a room that is close to the office or staff room. I accept this will enable participants to be seen by their head teacher and colleagues, which is unfortunate if they wished to remain anonymous. To counter this I shall be clear that anonymity cannot be guaranteed as the interviews are going to take place on school premises. I have considered offering off-site interviews and decided against this as there will be implications for audio recording. The interviews are not considered to relate to sensitive or personal information and participants will have the opportunity to factor in the location of the interview before they make their decision.

(iv) I have consulted the University's Lone Working Policy (UR, 2010) and am able to clarify that conducting interviews within normal working hours carries low risk. As the interviews will be less than one hour, I am complying with the recommendation of the policy. If I am conducting more than one interview I shall ring my supervisor or Director of Studies in between and/or walk through the school to facilitate being seen by staff.

It is likely that children will be in school while the interviews are taking place. I shall ask the participant to select a time and location that minimises the potential for interruptions or noise that could affect the quality of the recording.

In terms of emotional distress of participants, this is considered as a very low risk. Participants will be informed as to the scope and content of my study and will make an informed decision as to whether to be involved. I shall encourage participation by advocating the opportunity to engage in professional dialogue that will be used in a contribution to knowledge. Participants will have an element of control regarding what they disclose and as the interview questions will have been seen in advance the potential to surprise or catch individuals out is reduced.

Damage to the reputation of the school will be reduced through the open and honest introduction to all staff. I will be clear that my study relates to individual responses to policy directives and their

mathematics teaching. Should a participant make a comment regarding a colleague, I will advise them that individuals cannot be included within my data analysis. If the participant is being particularly derogatory towards a school or colleague I will ask them to refrain and if necessary terminate the interview.

(v) I am aware of the health and safety issues pertaining to work within a school, due to my teaching experience. I shall make myself aware of who to report an accident to and the fire evacuation procedures upon arrival of my first visit (UR, 2010). I shall sign in and out of the premises and ensure a member of staff is aware of my arrival and departure. I will ascertain from the head teacher the emergency contact details should the participant(s) be taken unwell or are involved in an accident within the interview process. If there are children on site, there will be an accompanying adult who I can consult should an incident occur.

Will any of your project take place outside the UK?

YES ☐ NO ☒

Country:

If you have answered yes please refer to Section 4.2 of the Ethics Guidelines, complete the Overseas Background Information form and consult with the Head of Health and Safety if necessary. Applicants should adhere to University Guidelines on Foreign Travel. If you are conducting research out of the UK but in your home country or the country in which you reside you should still complete this form.

PLEASE NOTE: it is your responsibility to contact Shamna Finnigan in Finance Department regarding travel assistance and medical cover

Please provide translations of participant facing documentation, if required (for student applications, these should be checked by your supervisor prior to submission)

Is this a clinical trial or a project which may involve abnormal risk to participants?

YES ☐ NO ☒

Will 'human tissue' samples need to be stored?

YES ☐ NO ☒

If you have answered Yes please contact the Ethics Administrator who will be able to direct you to the appropriate member of staff dealing with this. Please also refer to Sections 3.5 and 4.2 of the Ethics Guidelines

SECTION 5: PUBLICATION OF RESULTS

How will you disseminate your findings? (e.g. publication)

Early findings will be presented at the University of Roehampton's annual CEREPP student conference, as well as the Early Career Researcher conference at BERA during 2015.

The research study will be written as a professional text as my PhD thesis. It will be positioned to an audience of policy makers and teaching professionals. I will endeavour to avoid jargon and provide a thesis that is accessible to all readers as well as being informative (Trowler, 2003).

I shall also submit a paper for publication to a peer reviewed journal such as the Journal of Education Policy.

How will you ensure the anonymity of your participants?

(If your participants do not wish to remain anonymous you must obtain their written consent.)

(vi) I will apply Cohen, Manion & Morrison's (2011: 541) suggestion of respondent validation, where participants have the opportunity to view their interview transcript and my interpretations of the data pertaining to their responses to check that they have been represented accurately. I shall offer to e-mail the scripts to the participants and request an e-mail response; however they can telephone me to discuss if they would prefer. Participants can alert me should I have misrepresented them or applied my own bias and I will rectify this.

I will ensure participants' anonymity, as recommended by BERA (2011) and the University's Ethics Guidelines (2011) by using pseudonyms within the thesis. Schools will not be named at any time. When referring to participants' responses, I will not link the participant to their school.

The participants will be differentiated through aligning the pseudonym to their role ie. Head teacher, mathematics coordinator and teacher.

SECTION 6: STORAGE OF DATA

Section 2.7 of the *University of Roehampton Code of Good Research Practice* states the following: 'research data must normally be retained intact for a period of at least ten years from the date of any publication which is based upon it. Researchers should be aware that specific professional bodies and research councils may require a longer period of data retention'.

Data should be collected and processed in accordance with the Data Protection Act 1998 and with the University's Data Protection Policy.

Describe how and where the following data will be stored and how they will be kept secure:

Raw and processed data

Data in the form of digital recordings will be stored on a personal laptop, which is password protected and backed up on a USB memory stick, which is also password protected. As data is transcribed, pseudonyms of the participants will be used to ensure privacy (BERA, 2011). The transcript that I send to each participant will not include their pseudonym in order to reduce the opportunity of colleagues identifying each other within the final publication. I will regularly update a backup file on my University PC, which is password protected.

Following the publication of my thesis, I will remove the relevant files from my laptop and University PC. I will keep the data on my USB memory stick for 10 years (University's Ethics Guidelines, 2011).

Documents containing personal details of any participants

N/A

SECTION 7: EXTERNAL GUIDELINES, APPROVAL & FUNDING

Are there any relevant subject-specific ethics guidelines (e.g. from a professional society)? If so how will these inform your research process?

N/A

Has/will the project be submitted for approval to the ethics committee of any other organisation, e.g. NHS ethics approval? (Please see Section 4.3, Ethics Guidelines)

N/A

What is the outcome of this?

Is your project externally funded?

(Please note: you do not need to submit an ethics application or gain ethics approval for a project when applying for funding – this can be done when you receive confirmation that the application for funding has been successful)

YES ☐ NO ☒ If you have answered yes you must complete a P1 form and submit this to RBDO before you complete your ethics application.

Please state the name of the funding organisation/ company below and provide any other relevant information:

Has your P1 form been approved by your Head of Department?

YES ☐ NO ☐

SECTION 8: CHECKLIST

Please read through the checklist and check the box to confirm:

NB. this checklist is part of the Ethics Application and must be completed

Project Details

Have you completed your personal details? (Section 1) Yes ☒

Have you outlined the project and ethical issues? (Section 2) Yes ☒

Have you described your project in laymen's terms and avoided using too much technical jargon? Yes ☒

Have you focussed on the ethical issues and practical steps of carrying out the project rather than methodological arguments which are not relevant to this application? Yes ☒

Working with Participants

Have you completed details of how you intend to recruit participants and whether they will receive any reimbursement? (Section 3) Yes ☒

If you are working with under 18s or participants who might be considered to be vulnerable have you addressed the particular ethical issues involved in working with these participants? (Section 3) Yes ☐ NA ☒

Have you amended the Participant Consent Form (Template) for your project?

Have you attached any other information to your form that may be needed for participants, e.g. Debriefing Letter, Information Sheet? Yes ☒

Have you attached any other participant-facing materials to your form, e.g. recruitment posters, questionnaire, interview questions? Yes ☒

Have you confirmed that the relevant permissions to recruit/ carry out the project have or will be obtained? Yes ☒

If your project involves clinical trial/s, abnormal level of risk or working with animals have you read University Guidelines carefully? Yes ☐ NA ☒

Health and Safety

If your project is taking place outside the UK have you noted on the form where the project will take place, read section 4.2 of the guidelines and completed an Overseas Background Information Form ?	Yes ☐ NA ☒
If your project is taking place outside the UK, have you provided translations of participant facing documentation if required?	Yes ☐ NA ☒
Have you completed the Risk Assessment form describing the risks associated with your project and how you will implement control measures to address these?	Yes ☒
If your project involves interviews in a participant's home or lone-working have you considered the risks and control measures in the risk assessment? (E.g. advising a colleague/supervisor of the timings of visits, ringing before/ after interview and developing a contingency plan if contact is not made)?	Yes ☒
If your project involves clinical trial/s, abnormal level of risk, working overseas or working with animals, have you consulted with the Head of Health & Safety in drawing up your risk assessment?	Yes ☐ NA ☒
If your project involves clinical trial/s, abnormal level of risk, working overseas or working with animals have you marked this clearly on the form (Section 4) and read sections 3.5 and 4.2 of the guidelines?	Yes ☐ NA ☒
If observing animals, have you mentioned the possibility of attack (bites/ scratches) and precautions taken in respect of this?	Yes ☐ NA ☒
If working off site, have you confirmed that local guidelines and regulations will be complied with?	Yes ☐ NA ☒
Do you consider that this project is exceptional such that it requires confirmation from Finance that insurance cover is in place?	Yes ☐ No ☒

Publication of Results

Have you described on the form how you will publish your findings? (Section 5)	Yes ☒
Have you described how you will ensure the anonymity of your participants or asked your participants for explicit consent in your consent form to identify them in your research?	Yes ☒

Storage of Data

Are you aware that the University's Code of Good Research Practice requires you to retain data intact for a period of at least ten years from the date of any publication? (*Specific professional bodies and research councils may require a longer period of data retention.)*	Yes ☒
If a transcription service is to be used, have you included a copy of the confidentiality agreement with your application?	Yes ☒ NA ☐
Have you described how and where your data will be stored at the University and how this will be kept secure? (Section 6)	Yes ☒

External Guidelines & Funding

Have you noted any relevant subject-specific ethics guidelines (e.g. from a professional society) and considered how these will inform your research? (Section 7)	Yes ☒
Have you considered whether you have to apply for ethical approval through another organisation (e.g. NHS)? (Section 7)	Yes ☐ NA ☒
Have you provided full details of any external funding and the approval stage of your P1 form (staff only)? (Section 7)	Yes ☐ NA ☒

Applicant's Confirmation

Have you added an electronic signature or typed your name and date in the applicant's signature box?	Yes ☒
If you are a student has your supervisor checked your application form before submission?	Yes ☒ NA ☐
If you are a student has your Director of Studies checked your application form and added an electronic signature or typed their name and date on the form?	Yes ☒ NA ☐
Will you email the Ethics Officer and make sure you attach your Ethics Application Form and all documents, e.g. Participant Consent Form, Risk Assessment Form and any additional information for participants or for other purposes?	Yes ☒

Presentation

Have you completed the form using size 12 black font, using one font (e.g. Arial) throughout the form? Yes ☒

Have you proof-read your application form and attached documents? Yes ☒

Ethics Approval Process

Please note the following:

- the ethics approval process can take several weeks Yes ☒
- that you must not begin your project or enter into any agreement or contract until you have received email confirmation from the Ethics Officer that you can begin the project Yes ☒
- that the Ethics Application Form will be approved by your Department and the Ethics Committee may be asked to advise on problematic cases Yes ☒
- that you may be asked by the Ethics Officer to make revisions to your form and you will be asked to make these revisions within two weeks from the date of any email sent to you Yes ☒

SECTION 9: APPLICANT'S CONFIRMATION	
I confirm that the information supplied on this form is correct and confirm that the above checklist has been fully completed.	
Applicant's signature:	E Penfold *Please use an electronic signature or type your name*
Date:	19 June 2014
FOR STUDENTS ONLY: DIRECTOR OF STUDIES SIGNATURE (Where there is not a Director of Studies this should be completed by the Academic Supervisor)	

The Director of Studies is required to:

- *scrutinise the Ethics Application and all participant-facing documentation*
- *suggest and check any changes which need making before the form is submitted*

Please tick the box to confirm that you have approved the application and participant-facing documentation ☒

Signature:	
Print name:	S.Gifford
Date:	19/6/2014

The Application Form does **not** need to be printed out. The form and attachments should be sent by email to the Ethics Officer, Jan Harrison:

- Ethics Application Form
- Participant Consent Form
- Risk Assessment Form
- Any other information

  (e.g. information sheet, advertising material, questionnaires, debriefing letter)

Jan.Harrison@roehampton.ac.uk, 0208 392 5785

PLEASE NOTE: YOU MUST NOT BEGIN YOUR PROJECT UNTIL YOUR ETHICS APPLICATION HAS BEEN APPROVED

Appendix 7 – Head teacher consent

University of Roehampton London

SCHOOL PARTICIPANT CONSENT FORM

Title of Research Project: Primary teachers' perceptions of their professional identities before, during and after the Primary National Strategy with regard to teaching mathematics

I am seeking consent to undertake the below-mentioned research within your school which will involve recruiting and interviewing your staff.

I am interested in the perceptions of yourself as head teacher, along with the mathematics coordinator and teachers who qualified on or before 2006 regarding how they felt about the Primary National Strategy (PNS), which was launched in 2006. It would be most helpful if you could suggest the names of members of staff who fulfil these specifications and I will invite them to participate. Please note in the interest of anonymity and confidentiality I am unable to advise you of the names of participants. Participants are welcome to disclose their involvement with colleagues of their own volition but do not have to do so.

Names of participants will not be disclosed and to further maintain their anonymity and ensure confidentiality I will be unable to inform the head teacher or other staff members of participants' responses. Participants will be offered the opportunity to validate their interview responses and my interpretations confidentially.

Brief Description of Research Project, and What Participation Involves:

I wish to discover individual's perceptions of the support provided by the policy guidance and their beliefs in terms of relevance and impact upon their mathematical teaching practice within a historic context.

We are currently working in the absence of a national policy, as the National Strategies were archived in 2011. I am particularly interested in perceptions and feelings towards this in respect of current school policy and individual practice.

My research study will explore the notion of power that may be prevalent within policy directives at national and local authority level and the notion of school and teacher autonomy within the context of policy enactment. By exploring teachers' perceptions of policy and their beliefs regarding their enactment I hope to demonstrate support and contentions within the relationship that exists.

I want to offer participants the opportunity to contribute to knowledge related to how much structure they believe they need relating to the teaching and learning of mathematics. Participants will have an element of control as they select significant experiences from their teaching career to reflect upon and engage in professional dialogue about. The responses will be included within my PhD thesis as a genuine voice intent on shaping future policy initiatives.

I am inviting participants to be interviewed individually on school premises at times that are convenient between the hours of 8am and 5pm. The interviews will last approximately 40 minutes. I am planning to interview thirty participants within five schools; therefore selection will be on a first-come-first-serve basis with a maximum of seven per school.

I will distribute an interview pack to each participant with Government produced literature regarding the PNS to facilitate their memory of the strategies. Within this pack there will also be a copy of the interview questions. The purpose of this pack is for me to be transparent with my intentions; the interview questions will afford participants the opportunity to prepare for the interviews, the literature will serve as a reminder of the PNS. Participants are welcome to discuss the interview questions with colleagues; however this is not a pre-requisite of being included in the study.

Please be assured that participants and yourself as head teacher can withdraw from the research at any time, through verbal or written notification, without needing to provide a reason. Should a participant or the school withdraw, data obtained beforehand may be used within the thesis, although only within an aggregated form.

The interviews will be audio recorded and the digital file will be securely saved. Once the digital recording has been transcribed I will make the data available to each participant so that they can check the accuracy of my recording. The data (digital and transcribed) obtained from the interviews will be stored on computers that are password protected. Anonymity will be assured by the use of pseudonyms for individual's names and the omission of the name of the school.

A quiet room which is situated close the school's office or staff room is required for the interviews. Teachers who wish to volunteer will be contacted by e-mail with the date and time of their interview in an attempt to maintain anonymity. Please note I cannot assure the anonymity of participants during the interview itself, as we may be seen together.

Participants are welcome to discuss their interviews with colleagues if they choose; however I am unable to disclose participants' comments to any colleagues within school. All participants will be volunteers and will be selected on a first-come-first-serve basis. No criteria will be afforded to the selection process and I am unable to accommodate requests regarding who I should interview.

Participants can alert me should I have misrepresented them or applied my own bias and I will rectify this. I will offer to send the interview transcript and my interpretations of the data pertaining to participant's responses for them to check. I shall e-mail the scripts to the participants and request an e-mail response; however they can telephone me to discuss if they would prefer.

I am happy to discuss any concerns or questions you have at any time during the research study, details of how to contact me are listed below.

Investigator Contact Details:

Name: Mrs Evelyn (Lyn) Penfold

Department: Education

University address: Roehampton Lane, London

Postcode: SW15 5PJ

Email: Evelyn.penfold@roehampton.ac.uk

Telephone: 0208 392 3786

Consent Statement on Behalf of the School:

I agree for the research to be undertaken within my school, and am aware that I am free to withdraw the school's involvement at any point without giving a reason, although if I do so I understand that any data collected might still be used in a collated form. I agree for the researcher

to recruit and interview staff, without the requirement of disclosing names of participants or their responses. I understand that the information provided by my staff will be treated in confidence by the investigator and that the school's identity will be protected in the publication of any findings, and that data will be collected and processed in accordance with the Data Protection Act 1998 and with the University's Data Protection Policy.

Name ……

Signature ……

Date ……

Please note: if you have a concern about any aspect of your participation or any other queries please raise this with the investigator (or if the researcher is a student you can also contact the Director of Studies). However, if you would like to contact an independent party please contact the Head of Research.

Director of Studies Contact Details:

Name Dr Sue Gifford

University Address Roehampton Lane

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Appendix 8 – Participant consent

PARTICIPANT CONSENT FORM

Title of Research Project: Primary teachers' perceptions of their professional identities before, during and after the Primary National Strategy with regard to teaching mathematics

Brief Description of Research Project, and What Participation Involves:

I am interested in the perceptions of head teachers, mathematics coordinators and teachers of how they felt about the Primary National Strategy (PNS), which was launched in 2006. I wish to discover individual's perceptions of the support provided by the policy guidance and their beliefs in terms of relevance and impact upon their mathematical teaching practice within a historic context.

We are currently working in the absence of a national policy, as the National Strategies were archived in 2011. I am particularly interested in perceptions and feelings towards this in respect of current school policy and individual practice.

My research study will explore the notion of power that may be prevalent within policy directives at national and local authority level and the notion of school and teacher autonomy within the context of policy enactment. By exploring teachers' perceptions of policy and their beliefs regarding their enactment I hope to demonstrate support and contentions within the relationship that exists.

I want to offer participants the opportunity to contribute to knowledge related to how much structure they believe they need relating to the teaching and learning of mathematics. Participants will have an element of control as they select significant experiences from their teaching career to reflect upon and engage in professional dialogue about. The responses will be included within my PhD thesis as a genuine voice intent on shaping future policy initiatives.

I am inviting participants to be interviewed individually on school premises at times that are convenient between the hours of 8am and 5pm. The interviews will last approximately 40 minutes. I am planning to interview thirty participants within five schools; therefore selection will be on a first-

come-first-serve basis with a maximum of seven per school. It is crucial for the study that participants have been teaching since at least 2006 to the present day.

I will distribute an interview pack with Government produced literature regarding the PNS to facilitate participants' memory of the strategies. Within this pack there will also be a copy of the interview questions. The purpose of this pack is for me to be transparent with my intentions; the interview questions will afford participants the opportunity to prepare for the interviews, the literature will serve as a reminder of the PNS. Participants are welcome to discuss the interview questions with colleagues; however this is not a pre-requisite of being included in the study.

Please be assured that participants can withdraw from the research at any time, through verbal or written notification, without needing to provide a reason. Should a participant withdraw, data obtained beforehand may be used within the thesis, although only within an aggregated form.

The interviews will be audio recorded and the digital file will be securely saved. Once the digital recording has been transcribed I will make the data available to each participant so that they can check the accuracy of my recording. The data (digital and transcribed) obtained from the interviews will be stored on computers that are password protected. Anonymity will be assured by the use of pseudonyms for individual's names and the omission of the name of the school.

A quiet room which is situated close the school's office or staff room is required for the interviews. Teachers who wish to volunteer will be contacted by e-mail with the date and time of their interview in an attempt to maintain anonymity. Please note I cannot assure your anonymity during the interview itself, as we may be seen together.

Participants are welcome to discuss their interviews with colleagues if they choose; however I am unable to disclose participants' comments to any colleagues within school. All participants will be volunteers and will be selected on a first-come-first-serve basis. No criteria will be afforded to the selection process and I am unable to accommodate requests regarding who I should interview.

Participants can alert me should I have misrepresented them or applied my own bias and I will rectify this. I shall offer to send the interview transcript and my interpretations of the data pertaining to participant's responses for them to check. I shall e-mail the scripts to the participants and request an e-mail response; however they can telephone me to discuss if they would prefer.

I am happy to discuss any concerns or questions you have at any time during the research study, details of how to contact me are listed below.

Investigator Contact Details:

Name: Mrs Evelyn (Lyn) Penfold

Department: Education

University address: Roehampton Lane, London

Postcode: SW15 5PJ

Email: Evelyn.penfold@roehampton.ac.uk

Telephone: 0208 392 3786

Consent Statement:

I agree to take part in this research, and am aware that I am free to withdraw at any point without giving a reason, although if I do so I understand that my data might still be used in a collated form. I understand that the information I provide will be treated in confidence by the investigator and that my identity will be protected in the publication of any findings, and that data will be collected and processed in accordance with the Data Protection Act 1998 and with the University's Data Protection Policy.

Name …….

Signature ……

Date …….

Please note: if you have a concern about any aspect of your participation or any other queries please raise this with the investigator (or if the researcher is a student you can also contact the Director of Studies.) However, if you would like to contact an independent party please contact the Head of Research.

Director of Studies Contact Details:

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Appendix 9 – Ethics minor amendment form

ETHICS

MINOR AMENDMENT FORM

(March 2014)

Please use this form if any changes are made to your project:

PLEASE CHECK THE RELEVANT BOX *(NB. double click on the check box and select 'checked')* MEMBER OF STAFF ☒ RESEARCH STUDENT ☒ (MPhil, PhD, EdD, PsychD) EXTERNAL INVESTIGATOR ☐ STUDENT (Other) ☐	
PERSONAL DETAILS	
Name (lead):	Evelyn Penfold
Other investigators:	
Email:*(all correspondence will be sent by email unless otherwise requested)*	Evelyn.penfold@roehampton.ac.uk
FOR STUDENTS ONLY:	

Programme of study:	MPhil/PhD
Mode of study (full-time/part-time)	Part-time
Director of Studies: (If you are on a taught course please give the name of your tutor)	Dr Sue Gifford
FOR EXTERNAL INVESTIGATORS ONLY (please see Section 4.5 of the Ethical Guidelines):	
Name of Academic Assessor:	

PROJECT DETAILS			
Title of project:	An Investigation into the Extent that Policy can Determine the Teaching of Primary Mathematics		
Start date:	10/1/2012	Approval Date of Ethics Application:	12/8/2014
Please briefly outline the changes made to your project and reasons for these			

Title of project has changed to address the focal point of my research; teachers' perceptions. The new title is:

Primary teachers' perceptions of their professional identities before, during and after the Primary National Strategy with regard to teaching mathematics

I over-anticipated the level of anonymity needed at the initial meeting where I met with potential participants. I no longer ask potential participants to email me if they are interested in participating, instead I book appointments during the initial meeting. I made this amendment following the pilot study where participants indicated they were happy to book appointments in the presence of their peers.

The interview pack is no longer given as participants did not consult it/find it helpful. I do still provide a copy of the interview questions.

Applicant's Signature: E Penfold

Please use an electronic signature or type your name

Date: 12/5/15

OFFICE USE ONLY

☐ Approved (minor changes - no further action required)

☐ Departmental approval needed (Ethics Approval Form attached)

☐ Other – see comments below

COMMENTS

Name & Position:

Date:

Appendix 10 – Extract from research diary

16th December 2014, launched my project to staff at the pilot school. Am aware that I gushed and grovelled in order to 'sell' my project. Also allowed the teachers to talk too much about their initial thoughts, which means that I have lost the opportunity to gain useful data, uninfluenced by teachers' peers. Happy to note that they talked a lot about current assessment policy and NC. Although these are not addressed by my study, it's natural for participants to want to talk about them as they are policy related and there is an impact upon them right now, as opposed to historically. I will aim to guide participants back to my interview questions though so that I can pursue my topic. I gave out the interview questions and the participants are going to meet to talk these through. Colleagues have warned me about this, it could affect teachers' responses, but I still think preparation enriches responses. My original intention to send the interview pack was forgotten and I don't have email addresses of the participants to send the pack to. One of the participants mentioned that there was a copy of the PNS in school and they would have a look through it. The 1997-2011 document is less likely to be in school, although I took a copy in with me I didn't show it to the participants. I will email the pack to the office in the new year and ask them to distribute it accordingly.

The head teacher was unavailable as she had been called into a meeting. I didn't get the school consent form signed and reluctantly gave it to the maths coordinator who said she would get it signed and sent to me at UR. Have made a diary note to contact the head in the new year to check she is still happy for my research to proceed in her school. The maths coordinator and two teachers signed their participant consent forms on the spot, I think this is better than my initial idea of asking them to email me to say they are interested. There was no issue of not being involved, they seemed happy to do so and were relieved when I said I would only take one hour of their time. Interviews have been booked, without the head teachers' involvement. I got the sense that the head teacher would approve based on the fact she had asked them to meet with me today. I didn't leave a copy of the interview questions for the head teacher. A small part of me thought that this was a good opportunity to test the suitability of giving the questions in advance and as the head wasn't present I didn't feel bad about not giving her the questions. It might have been better to give 2 the IV questions and leave 2 without but I didn't feel comfortable about doing this. When I

interview the head, I'll ask her how she felt about not seeing the questions in advance. Should also ask the other participants how they felt about seeing the questions in advance.

A participant asked me what I intended to do with the end result – a good question that I had not covered in my initial launch. I explained that I want to know how policy affects teachers and with the new policy guidance regarding assessment and the NC, this is a well timed study. I'll make sure I make this clear at the outset at subsequent launches.

26th January 2015

Pilot study x 2 interviews. Very excited and not even a little bit nervous. Pleased to notice that I didn't lead participants too much, just agreed with everything they said. First participant was nervous although she did relax as we got going. The idea of using sketches was not successful as neither participant wanted to do this. I'm amazed that I spent several minutes within the first interview trying to convince the participant to create a sketch and then with the second one I just mentioned it briefly and said that it hadn't been used so far.

Distinct difference of attitudes between KS1 and KS2 teachers. Hadn't anticipated this. Have modified questions to directly ask whether policy is sufficient to ensure good teaching as it seemed that we skirted around this issue.

Started to type up the transcript to gain a sense of how I wanted to view them. Tedious and time consuming. Happy to do first 2 as suggested by my supervisor but even happier to employ a transcriber to do this! 12th March – too expensive so need to do transcriptions myself! Bought a voice recorder which cuts time drastically and I do gain a good idea of the participant's viewpoint while I make the transcript. What I notice more though as I make the transcript is my role, how much I'm saying, which is basically too much.

Most of my comments were positive, ok and yes. The odd secondary question but nothing that I want to add as yet.

Both participants mentioned the use of a maths scheme and I think I might pursue this. I'll wait to see if the remaining two participants mention it before deciding whether to include it in future questions. Could be a very interesting emergent factor, which I can explore with the question why

is a scheme accepted readily when it has to be paid for and has been produced by a commercial company?

Second interview, I allowed her to talk off task for too long. She was talking about what happens after SATs in May, which isn't related to research questions. I asked what happened post SATs in response to her saying that she had to prepare children for the SATs and that was the priority in Y6. As she had also mentioned the complex difficulties of the NC I wanted to find out if she thought it necessary to continue teaching from the NC post SATs. She didn't!

Appendix 11 – Extract from reflections of data analysis

4 February 2016

Have over-analysed the transcripts from Kersley school. This was my pilot study school and so I gave the data a lot of attention before and now I am revisiting with the new themes I am likely duplicating a lot of nodes.

I will need to review the nodes associated with my pilot study and delete the nodes that are mainly populated with data from Kersley school.

15 February 2016

Have decided to review data and create parent nodes (themes) that resonate with the lit review. I'm realising that I have probably wasted time creating some of the initial codes as I now have to rename them and/or merge them. This is because I used the interview questions to create codes e.g. accountability and responsibility and now I need to decide if this is a new code in its own right or can be merged into a theme from the lit review such as professional identity.

Is confidence part of teacher agency or professional identity?

I should consider whether confidence is more of an issue for FS/KS1 teachers.

I must remember to look for the use of I/we within the transcripts, as per a colleague's feedback from my presentation (July 2015).

24 February 2016

Focusing on impact upon children and professionalization/professionalization today and finding it fairly intuitive to code, which reinforces my choice of codes/themes.

8 March 2016

Trying to rationalise how my research questions have informed my themes is worthwhile but not easy. I am thinking about what I wanted to find out and am pleased to see that the themes do relate to the research questions. The research questions have not been at the forefront of my mind for some time so it's good to have this opportunity to rationalise and justify. I am beginning to think that teacher identity can be merged with professional identity and support through resources can

be merged with support through training. They can be merged as I'm giving the same research question and the same rationale for both themes. Looks the same for policy enforcing factors and policy agents' drivers, the same research question and rationale applies.

The identification of themes is an emerging process. In the space of three weeks I have reviewed my themes and made changes. By looking at the theme's defining features I have identified overlapping themes, which have been merged.

The themes continue to evolve as I continue coding. The theme becomes a lens in which to view the data, whereas at the outset I was recalling the participant as I read through their responses. Viewing the data through the lens of the theme also broadens the analysis e.g. I am now considering impact upon children with regard to any aspect of teaching maths rather than just when the participant was recollecting their usage of the PNS. I've progressed from reading a transcript and coding what I thought was interesting to looking for the themes.

Appendix 12 – A summary of the NNS policy documentation

The NNS included the following documents:

Framework for Teaching Mathematics from Reception to Year 6

Included year by year learning objectives from the NC and worked models of how concepts could be taught.

Mathematical Vocabulary booklet

Listed by year group and contained familiar and new vocabulary.

Teaching Mental Calculation Strategies: Guidance for Teachers at Key Stages 1 and 2

Contained yearly expectations and strategies for teaching mental calculations, included pupils' work.

Teaching Written Calculation Strategies: Guidance for Teachers at Key Stages 1 and 2

Provided guidance regarding the connection to mental calculations. Explained progression from informal to formal written strategies. Pupils' work included and discussed.

Standards in Mathematics: Exemplification of Key Learning Objectives from Reception to Year 6

Described and exemplified the learning objectives drawing on pupils' work.

Appendix 13 – A summary of the PNS policy documentation

The PNS included:

Framework for literacy and mathematics

Provided ideas for teaching pedagogy. Yearly learning objectives arranged into strands that mirror the NC's learning objectives and also by year group. Learning objectives organised into blocks and units.

Online planning materials

Showed progressive teaching steps. Provided links to teaching materials e.g. the interactive teaching programmes.